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CONTENTS

Smooth surface caries in white rats—McClure 1
Caries-resistant and caries-susceptible rats—Sreebny 9
Vital pulp therapy for deciduous teeth—McDonald 14
Methods of feeding infants with cleft palates—Lifton 22
Facial injuries in automobile casualties—Kulowski 32
Prepayment plan for children in fluoridated area—Young 38
Root canal obturation—Ingle 47
Determination of monomer in polymethyl methacrylate—Caul 56
Monomer and some properties of self-curing resins—Caul 60
Reports of councils and bureaus 64
Editorials 82
International correspondence 86
News of dentistry 90
The reader comments 112
Cases and comments 113
Book reviews 116
Current literature 122
Deaths 131
Directory 135
Announcements 137

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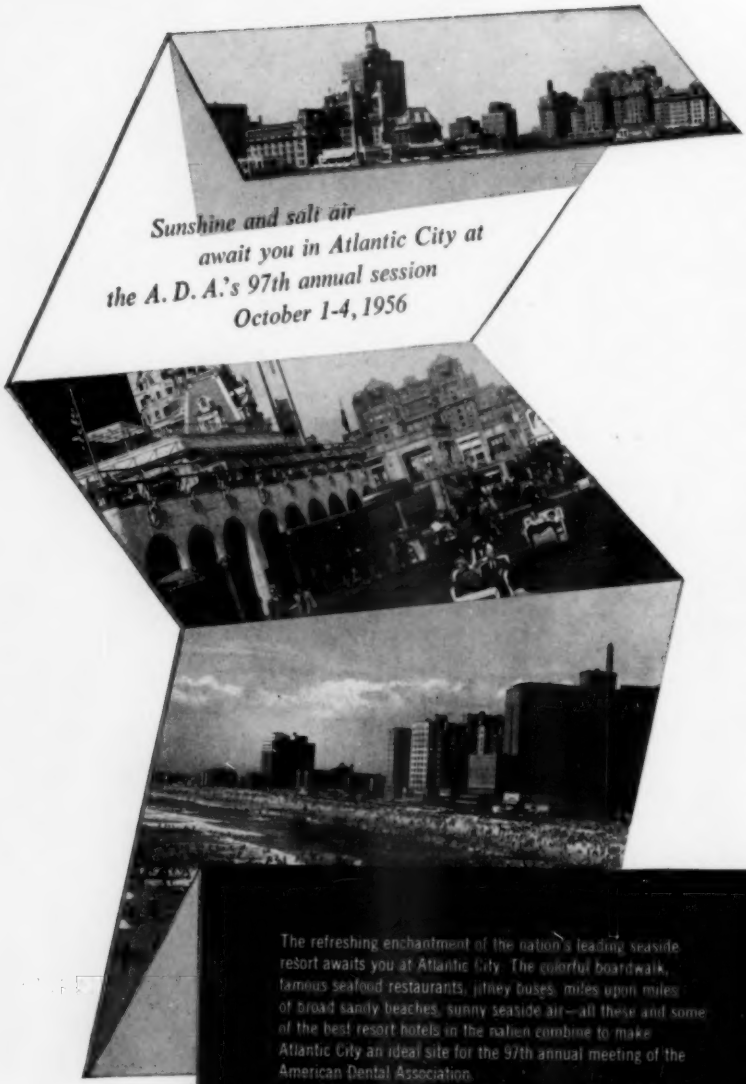
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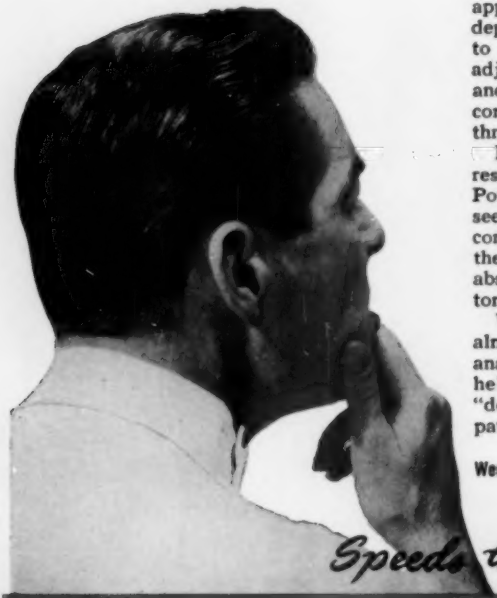

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• • •

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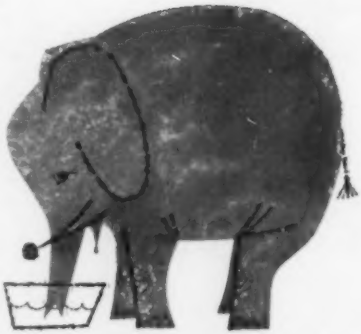

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1. Watt, B. K., and Merrill, A. L.: Composition of Foods—Raw, Processed, Prepared, Washington, D. C., United States Department of Agriculture, Agricultural Handbook No. 8, 1950.
2. Sherman, H. C.: Chemistry of Food and Nutrition, ed. 8, New York, The Macmillan Company, 1952, p. 598.
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4. Stewart, R. A.; Hensley, G. W., and Peters, F. N., Jr.: The Nutritive Value of Protein. I. The Effect of Processing on Oat Protein, J. Nutrition *26*:519 (Nov.) 1943.
5. Jones, D. B.; Caldwell, A., and Widness, K. D.: Comparative Growth-Promoting Values of the Proteins of Cereal Grains, J. Nutrition *35*:639 (June) 1948.
6. Jones, D. B.: Sex Differences in the Growth of Young Rats and Survival of Adult Rats Fed Protein-Deficient Diets, J. Nutrition *44*:465 (July) 1951.
7. Sherman, H. C.; Winters, J. C., and Phillips, V.: Efficiency of Oat Protein in Adult Human Nutrition, J. Biol. Chem. *39*:53, 1919.

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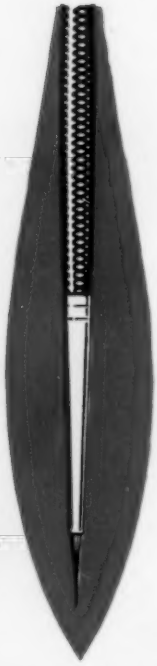

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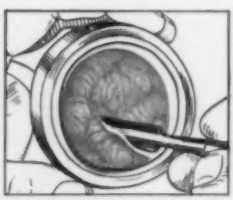

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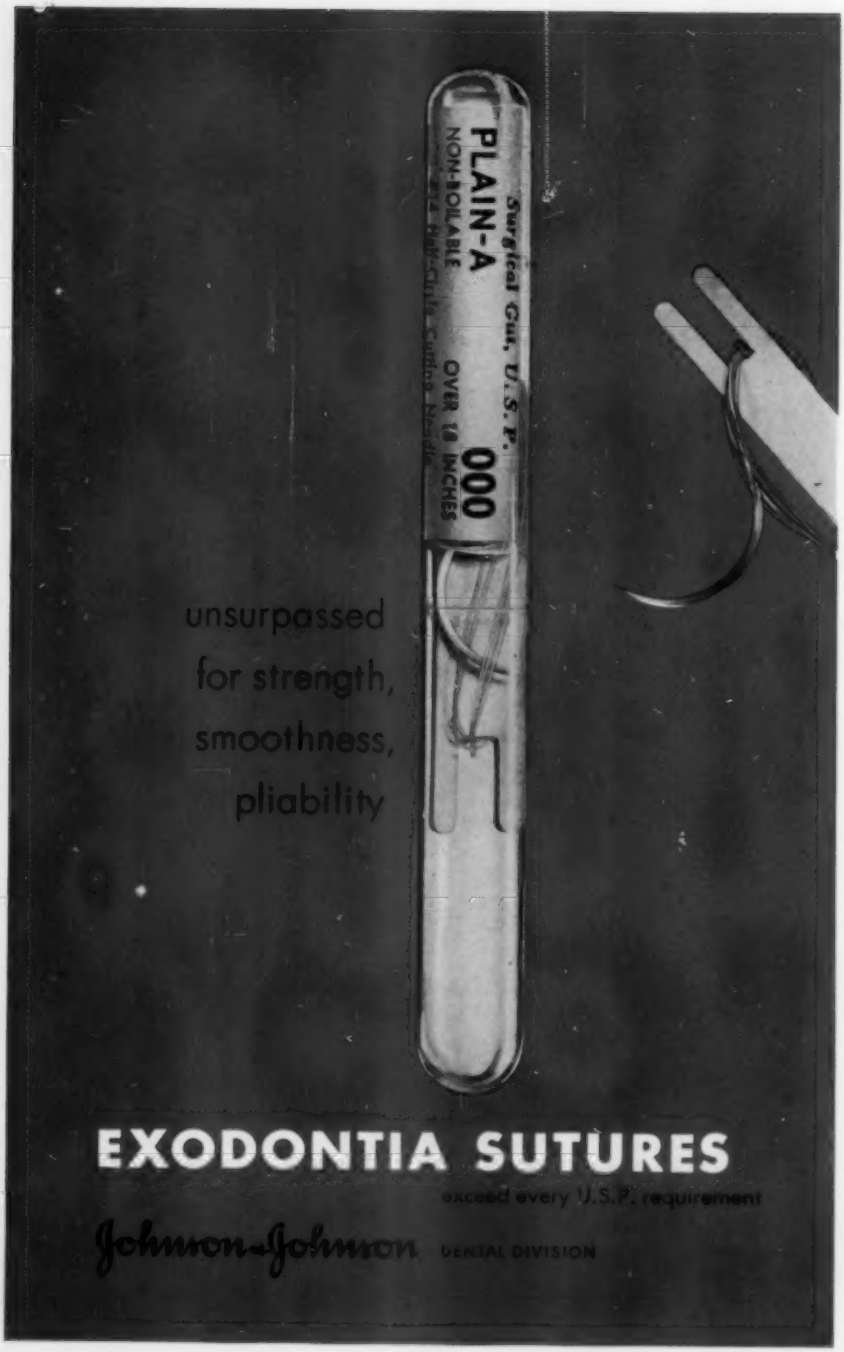
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Smooth surface caries in white rats: effects of fluoride, iodoacetate, penicillin, Crisco, butterfat and a salt mixture

F. J. McClure, Ph.D.; J. E. Folk,† Ph.D., and John D. Rust,* B.S., Bethesda, Md.*

The results of experiments on smooth surface caries in white rats have been previously reported.[1-7] Studies are now in progress to determine what components and properties of the diet may be involved in the development of this type of caries and what agents or conditions promote or inhibit its incidence and severity.

In a recent symposium, the effects of metallic and nonmetallic compounds, organic compounds, fluoride compounds and antibiotic agents on experimental caries were discussed.[8] There is consistent and substantial evidence that fluoride, iodoacetate and penicillin have a considerable preventive effect on experimental rat caries generally classified as the occlusal fissure type.[8] There are other reports that penicillin, Terramycin (oxytetracycline), a salt mixture and Wesson oil were preventive toward smooth surface caries.[8] Corn oil, olive oil, Wesson oil, Crisco and lard were reported to be preventive toward fissure caries in rats.[9] Butterfat, according to another study,

*National Institute of Dental Research, National Institutes of Health.

†Research associate, National Institute of Dental Research, National Institutes of Health, Fellowship Division of the Council on Dental Research of the American Dental Association.

1. Stephan, R. M. Development of caries on the buccal and lingual tooth surfaces of rats as well as proximal and fissure caries. (Abst.) J. D. Res. 30:484 Aug. 1951.

2. McClure, F. J. Dental caries in rats fed a diet containing processed cereal foods and a low content of refined sugar. Science 116:229 Aug. 29, 1952.

3. McClure, F. J., and Folk, J. E. Skim milk powders and experimental rat caries. Proc. Soc. Exper. Biol. & Med. 83:21 May 1953.

4. Folk, J. E., and McClure, F. J. Cariogenic effects of skim milk powder fractions and heat-processed whey powders. (Abst.) J. D. Res. 33:658 Oct. 1954.

5. McClure, F. J., and Folk, J. E. Experimental variables affecting caries production in rats fed diets containing processed foods. J. D. Res. 34:358 June 1955.

6. McClure, F. J., and Folk, J. E. Observations on the production of smooth surface rat caries by diets containing skim milk and whey powders. J. Nutrit. 55:589 April 1955.

7. Losee, F. L., and Nemes, J. L. Human type caries distribution in Osborne-Mendel rats kept on heated skim milk powder diet. Proc. Soc. Exper. Biol. & Med. 87:429 Nov. 1954.

had no effect on fissure caries.[10] A 35 per cent level of fat, mostly lard, was credited with having a considerable inhibitory effect on fissure caries in the cotton rat, according to results based on two to six animals per group.[11] Inhibition of hamster caries has been related to dietary supplements of arachis oil, hydrogenated arachis oil and lard,[12] and also cocoa fat, olive oil and poppy seed oil.[13]

The data of this study pertain to the posteruptive effects of fluoride, penicillin, iodoacetate, butterfat, Crisco and Osborne-Mendel salts, respectively, on the smooth surface caries associated with National Institute of Dental Research (NIDR) diet 636[3] and also the effect of butterfat on this same type of caries as associated with NIDR diet 635.[3]

METHOD

The evaluation of caries produced in these experiments and the preparation of the diets are described elsewhere.[3, 6] Diet 635 contained 35 per cent of a commercial roller-processed skim milk powder, 45 per cent cornstarch, 18 per cent glucose and 2 per cent liver powder. Diet 636 was the same as diet 635 except that the skim milk powder was "dry autoclaved."[3] The majority of the carious lesions occur on lower buccal surfaces and bear a close resemblance to gingival caries in human beings (Fig. 1). Two strains of rats, Holtzman and Sprague-Dawley, were employed in each experiment. The rats were started on experiment at weanling age, were housed two per cage and were on the diets for approximately 90 days. Littermates were used to compare control with modified diets. Both sexes were represented in all comparable groups. The general management and plan of the studies are indicated in Table 1, in which the data are presented.

The effects of sodium fluoride and iodoacetate were evaluated in two series of experiments using diet 636 (Table 1, experiment 1-a, 1-b and 1-c and 2-a through 2-e). The effect of penicillin (1-ephenamine penicillin G)[14] was evaluated in experiment 2-f and 2-g. The penicillin diet was renewed every day; the other diets, five days per week. Feeding was ad libitum.

One series of experiments (3-a, 3-b and 3-c) determined the effect of 13 per cent butterfat and 13 per cent Crisco added to diet 636. In another series (4-a, 4-b, 4-c and 4-d), 10 per cent butterfat was added to diets 635 and 636. The butterfat and Crisco replaced an equivalent amount of cornstarch in the diet. For experiment 4-d, butterfat was added to the same skim milk powder used in diet 635 (4-a) and the mixture "dry autoclaved" before using it to prepare diet 636. In this way it was possible to evaluate the effect of a prior heat treatment on this mixture of butterfat and skim milk powder.

Experiments 5-a and 5-b were designed to study the effect of adding 4 per cent Osborne-Mendel salts,[15] with sodium fluoride omitted, to diet 636 in place of 4 per cent of the cornstarch. Without these salts, the diet contained 2.72 per cent ash, 0.42 per cent calcium and 0.38

8. Sognnaes, R. F., editor. Advances in experimental caries research. Washington, D. C., American Association for the Advancement of Science, 1955.

9. Rosebury, T., and Karshan, M. Susceptibility to dental caries in the rat. VIII. Further studies of the influence of vitamin D and of fats and fatty acids. J. D. Res. 18:189 June 1939.

10. Holmes, J. O., and others. Dental caries in the rat (Mus norvegicus). Federation Proc. 6:409, 1947.

11. Schweigert, B. S., and others. Dental caries in the cotton rat. VI. The effect of the amount of protein, fat, and carbohydrate in the diet on the incidence and extent of carious lesions. J. Nutrit. 31:439 April 1946.

12. Gustafson, Gösta, and others. Experiments with various fats in a cariogenic diet. IV. Experimental dental caries in golden hamsters. Tandlaegebl. 59:107 Feb. 1955.

13. Gustafson, Gösta; Stelling, Em, and Brunius, Edvard. Experimental dental caries in golden hamsters. Experiments with dietary fats having different contents of unsaturated fatty acids. Brit. D. J. 95:124 Sept. 15, 1953.

14. Compenamine (1-Ephenamine Penicillin G), assaying 1,066 units per milligram, was supplied by Commercial Solvents Corporation.

15. Osborne, T. B., and Mendel, L. B. Use of soy beans as food. J. Biol. Chem. 32:369 Dec. 1917.

per cent phosphorus. Practically all the minerals of diet 636 are provided by the 35 per cent skim milk powder and 2.0 per cent dried liver. Diet 636 with added Osborne-Mendel salts contained 5.69 per cent ash, 0.93 per cent calcium and 0.66 per cent phosphorus.

RESULTS

Effect of Fluoride, Iodoacetate and Penicillin on Smooth Surface Caries • The data obtained in these studies appear in Table 1. The carious lesions are illustrated in Figure 1.

Fluoride, iodoacetate and penicillin were consistently preventive toward caries when added to diet 636. The effect of fluoride was demonstrated by a pronounced difference between the control and experimental groups in caries incidence (percentage of the rats having caries), in the number of carious teeth per rat and in the caries score which is used to evaluate relative severity.[3] The data for the two levels of fluoride (experiment 2-b and 2-c) suggest a slightly greater effect at the higher level of fluoride, a result comparable to the relative effects of increasing quantities of fluoride on occlusal surface caries.[16]

16. McClure, F. J. Observations on induced caries in rats. III. Effect of fluoride on rat caries and on composition of rats' teeth. J. Nutrit. 22:391 Oct. 1941.

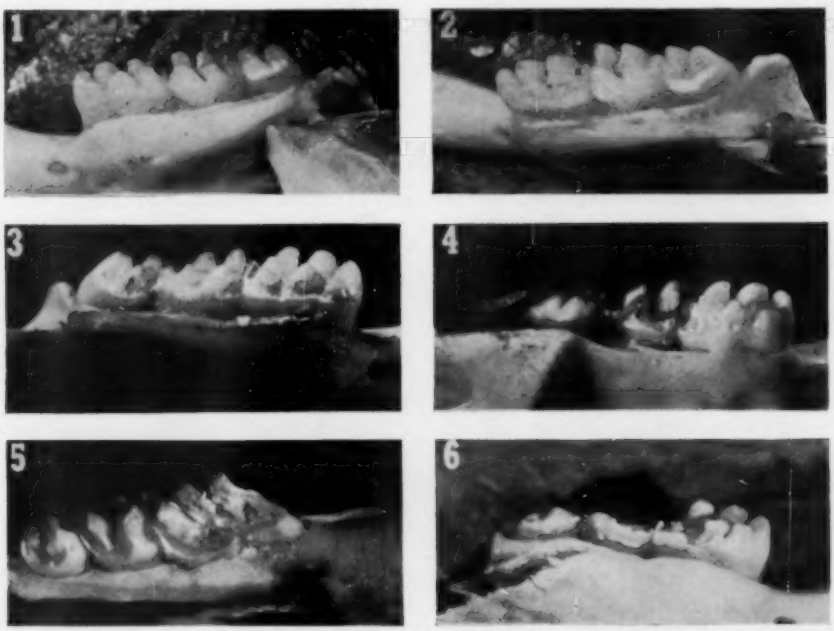

Fig. 1 • Carious lesions. 1, 2: Initial carious lesions on lower buccal surfaces. 3: Progress of caries particularly as it follows line of gingival attachment. 4, 5: Carious lesions involved dentin and much of buccal surface. 6: Crowns of second and third lower molars were destroyed. (Illustration from McClure, F. J. Dietary factors in experimental rat caries. In Advances in experimental caries research, Sognnaes, R. F., editor. Washington, D.C., American Association for the Advancement of Science, 1955)

Table 1 • Effect of sodium fluoride, iodoacetate, penicillin, butterfat, Crisco and Osborne-Mendel salts on smooth surface caries in rats

Exp.	Supplements present in diet or drinking water	No. of rats	Daily gain (Gm.)	Rats with caries (%)	Carious teeth per rat (Av.)	Severity score per rat (Av.)
	Effect of fluoride, iodoacetate and penicillin in diet 636					
1-a	Unsupplemented	35	0.3	82.9	4.9	14.6
1-b	Sodium fluoride—50 ppm F in water	33	0.3	21.2	0.4	0.7
1-c	Iodoacetate—20 ppm in diet; 200 ppm in water	33	0.2	18.2	0.4	0.5
2-a	Unsupplemented	28	0.8	89.3	3.8	8.4
2-b	Sodium fluoride—25 ppm F in water	13	0.8	46.2	0.5	0.9
2-c	Sodium fluoride—50 ppm F in water	13	0.9	15.4	0.3	0.9
2-d	Iodoacetate—50 ppm in diet; 10 ppm in water	12	0.8	66.7	1.6	2.4
2-e	Iodoacetate—100 ppm in diet; 20 ppm in water	12	0.6	50.0	1.2	2.2
2-f	Penicillin—5 units per Gm. in diet	13	0.8	30.8	0.6	0.7
2-g	Penicillin—10 units per Gm. in diet	13	0.9	15.3	0.2	0.3
	Effect of butterfat and Crisco in diets 635 and 636					
3-a	Unsupplemented—diet 636	40	0.6	95.0	2.9	8.4
3-b	Butterfat in diet 636—13%	37	0.4	77.8	1.9	4.3
3-c	Crisco in diet 636—13%	38	0.4	64.9	1.2	2.0
4-a	Unsupplemented—diet 635	40	1.9	75.0	2.2	4.8
4-b	Butterfat in diet 635—10%	37	1.9	35.1	1.0	1.6
4-c	Butterfat in diet 636—10%	38	0.8	71.1	2.0	3.7
4-d	*Butterfat in diet 636—10%	33	0.6	72.8	2.3	4.4
	Effect of Osborne-Mendel salts in diet 636					
5-a	Unsupplemented	38	1.1	89.5	2.8	7.8
5-b	Osborne-Mendel salts in diet—4%	35	1.2	48.6	1.1	2.5

*Butterfat was autoclaved with milk powder.

Iodoacetic acid also was preventive toward smooth surface caries. When iodoacetic acid was added at different levels to the diet and drinking water, the highest amount in the diet and water combined (1-c in Table 1) had the most pronounced preventive effect. In this study (1-c), the difference between the control and experimental group in caries incidence was 78.0 per cent, in the number of carious teeth per rat, 91.8 per cent, and in the caries severity score, 96.6 per cent.

Penicillin at a level of 10 units per gram of diet (experiment 2-g) appeared to be considerably more preventive than at 5 units per gram (2-f). The small additions of penicillin to diet 636 caused a significant difference between the control and experimental groups in caries incidence, number of carious teeth per rat and caries severity score. The results for experiments 2-a, 2-c, 2-e and 2-g appear graphically in Figure 2.

Effect of Butterfat and Crisco on Smooth Surface Caries • Statistical analysis was made of severity scores and caries incidence. Severity scores were analyzed according to Fisher's "t" test of paired values. Difference in incidence was analyzed on a paired basis by the chi square test, $p > 0.05$.

This statistical analysis indicates that the difference in caries severity and the difference in caries incidence between the group receiving diet 636 unsupplemented and the group receiving diet 636 supplemented with Crisco were significant (experiment 3-a and 3-c). Butterfat added to diet 636 (3-b), however, did not change the caries incidence significantly, according to a statistical analysis of the data, and the difference in severity had only borderline statistical significance. A comparison of the data from experiment 4-a with that from 4-b showed a statistically significant effect of butterfat added at a 10 per cent level to diet 635. There

was a difference between the control and experimental groups in caries incidence of 53.2 per cent, in the number of carious teeth per rat of 54.5 per cent and in the caries severity score of 66.7 per cent. Previous studies, as well as results obtained in these experiments, indicate that diet 636 is generally more cariogenic than diet 635; this fact might account for the difference in the caries preventive effect of butterfat in the two diets.

Butterfat autoclaved with the skim milk powder of diet 636 apparently was comparable to butterfat added to diet 636 without the autoclaving treatment. As shown by the results in experiment 4-c and 4-d, caries experience was about the same in both these groups. The effect of butterfat and Crisco in diet 636 is shown graphically in Figure 3.

Effect of Osborne-Mendel Salts on Smooth Surface Caries • The Osborne-Mendel salt mixture modified the cariogenic property of diet 636 to a rather remarkable extent (Table 1). There was a difference between the control and experimental groups in caries incidence of 45.7 per cent, in the number of carious teeth, 60.7 per cent and in the caries severity score, 67.9 per cent. These differences were statistically significant. These caries data are shown graphically in Figure 4.

Inspection of the data in Table 2 shows no apparent effect of the Osborne-Mendel salt supplement on the ash, calcium and phosphorus content of the molar dentin and enamel.

DISCUSSION

The exact mechanisms by which the incidence and severity of this experimental smooth surface rat caries was affected posteruptively by fluoride, iodoacetate and penicillin are not known. It has been established that fluoride is incorporated posteruptively into rats' teeth,[16] and resistance to caries possibly is dependent on the addition of fluoride to dental tissues. In regard to this particular posteruptive effect of fluoride on experimental caries, however, the role of fluoride added to the teeth has not been resolved.[17] Iodoacetate may be effective through a modification of the metabolic activity and products of the oral flora.[18] Antibiotics likewise may change the spectrum of the oral flora.[19] It is indicated by these results with penicillin and possibly with iodoacetate that bacterial action within the oral cavity, or possibly in the diet itself,[5] is involved in this development of smooth surface caries. Whatever the mechanism of their action, these three agents again proved to be significantly effective in preventing experimental dental caries. Fluoride, of course, is also preventive toward the carious process in human beings.[20] Penicillin has had inconsistent effects on human dental caries.[21, 22]

The dietary supplement of Osborne-Mendel salts had no significant effect on the percentage of ash, calcium, and phosphorus and on the calcium:phosphorus ratio of the dentin and enamel. It would seem, therefore, that the caries preventive effect of these salts was not due to a change in these mineral components of the dentin and enamel. These additional minerals, it may be emphasized, were ingested after the molar teeth were practically completely calcified. Prepared without the usual

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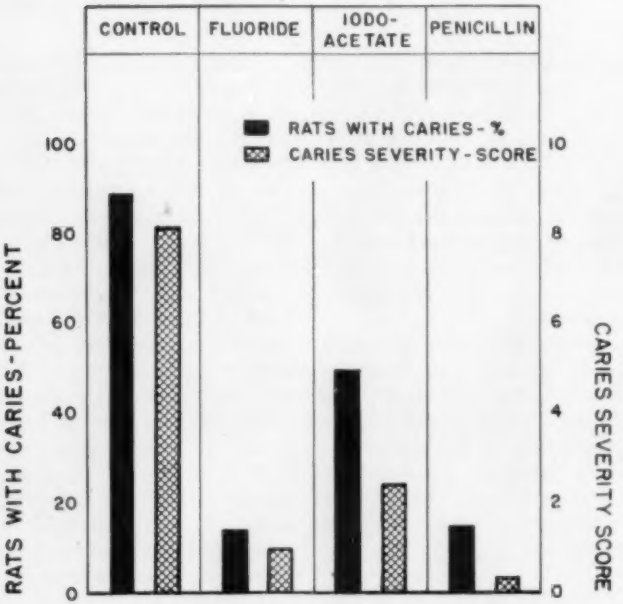

Fig. 2 • Effect of fluoride, iodoacetate and penicillin on smooth surface caries produced by diet 636

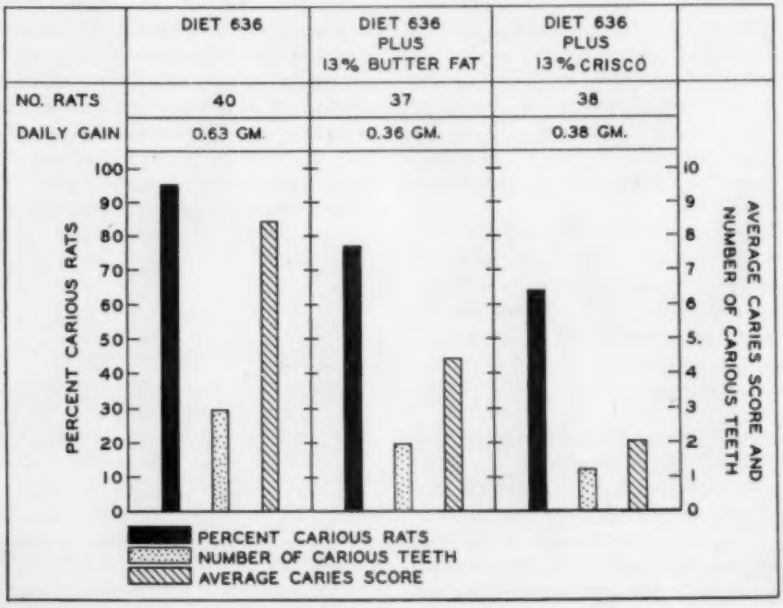

Fig. 3 • Effect of butterfat and Crisco on smooth surface caries produced by diet 636

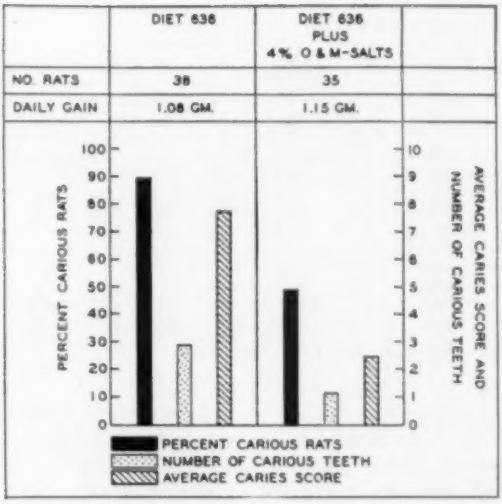

Fig. 4 • Effect of 4 per cent Osborne-Mendel salts on smooth surface caries produced by diet 636

sodium fluoride, this salt mixture analyzed 33.8 ppm of fluoride. This diet with added Osborne-Mendel salts analyzed 1.8 ppm of fluoride, an amount too small to have had this caries preventive effect. The validity of this result with Osborne-Mendel salts on smooth surface caries is supported by other unpublished studies by the authors in which Osborne-Mendel salts were preventive toward smooth surface caries usually produced by NIDR diet 586.[2]

It may be surmised that the effect of butterfat and Crisco could be due to a change in a physical property of the diets. How this change would prevent caries is purely speculative, but in consideration of the fact that a majority of the smooth surface caries in these studies were observed on lower buccal surfaces, it is realized that physical properties affecting the capacity of the diet to be retained on tooth surfaces could be important. Physical attributes of foods which may affect their retentive property have not escaped previous attention as a factor of cariogenicity.[23, 8] Some speculation also has been made that caries prevention by various fats may be related to their degree of saturation. Thus far the evidence has not substantiated this hypothesis.[12, 13]

SUMMARY

A posteruptive preventive effect of fluoride, iodoacetate and penicillin on smooth surface caries in white rats was demonstrated. The results compare with previous studies which show that occlusal fissure caries also is significantly prevented by these agents.

A modification of cariogenic diet 636 by replacing equivalent cornstarch with 13 per cent Crisco prevented smooth surface caries significantly. Butterfat at this same level in diet 636 did not prevent caries incidence significantly, and the effect on caries severity had questionable

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Table 2 • Ash, calcium and phosphorus in teeth of rats given diet 636 compared with those given diet 636 plus 4.0% Osborne-Mendel salts

Molar	Diet 636				Diet 636 plus Osborne-Mendel salts			
	Ash %	Ca %	P %	Ca:P	Ash %	Ca %	P %	Ca:P
Sound upper—enamel	95.05	38.13	18.23	2.09	93.88	39.58	18.58	2.13
Sound upper—dentin	75.76	38.60	18.35	2.10	75.00	38.21	18.37	2.08
Sound lower—enamel	92.93	39.01	18.78	2.08	95.15	39.66	18.73	2.12
Sound lower—dentin	75.00	37.52	17.98	2.09	74.51	38.12	18.67	2.04
Carious upper—enama	94.00	38.15	18.17	2.10	*	—	—	—
Carious upper—dentin	75.25	38.00	18.12	2.10	—	—	—	—
Carious lower—enamel	92.93	37.99	17.65	2.15	94.12	39.02	18.68	2.09
Carious lower—dentin	78.79	36.36	17.63	2.06	78.00	38.15	18.17	2.10

*There were no carious upper teeth in this group of rats.

significance. Ten per cent butterfat replacing an equivalent amount of cornstarch in diet 635, however, prevented smooth surface caries. A supplement of 4 per cent Osborne-Mendel salts which replaced 4 per cent cornstarch in diet 636 also prevented smooth surface caries significantly. This caries preventive effect occurred practically entirely after molar tooth calcification in the rats was completed.

The objectives of this study were to throw light on the mechanism of the smooth surface caries associated with NIDR diets 635 and 636, as well as to compare this type of caries with occlusal fissure caries. In these regards the response to penicillin, iodoacetate and fluoride suggests similarities in the characteristics of these two types of caries. There is but little information in this study which throws light on fundamental properties of these two diets responsible for their cariogenic effect.

Duties of a Reader • The reader of scientific papers, as the audience of the writer, should discharge with diligence the important responsibility associated with the privilege of reading scientific papers. He should tolerate neither inaccurate and unfounded data nor careless interpretations and discussions. He should study the papers analytically, critically, and with the devotion to scientific thought that he would exercise were he himself producing an article from the data available in the paper. *George E. Burch, Of Publishing Scientific Papers, 1954, p. 14.*

Morphologic and enzymatic differences in caries-resistant and caries-susceptible albino rats

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In 1944, Hunt, Hoppert, and Erwin[1] developed two inbred strains of rats of different caries-susceptibility. Animals of the caries-susceptible strain, if placed on a cariogenic diet at the age of 35 days, develop the first clinically visible carious lesions at the age of 70 days. Animals of the resistant strain under the same conditions are found free of caries until 400 to 500 days of age. Mechanisms underlying the different caries-susceptibility of these two strains have been sought in the structure of the enamel, in the bacterial flora and in the salivary secretion.

Nakfoor, Hunt and Hoppert[2] showed that when the rats were 60 days of age, the lower molars of the resistant strain fractured less readily than those in animals of the susceptible strain. This was not thought to be an important factor in the initiation of dental caries, since few spontaneous fractures had occurred in the molar teeth of the susceptible rats at a time when caries had appeared in nearly half of these animals. Furthermore, the relative weakness of the molars in the susceptible rats may have been influenced by incipient decay. Jay[3] recovered lactobacilli more frequently and in greater numbers in the susceptible than in the resistant rats. Jay's observation was confirmed in later studies by Rosen and others,[4] who further stated that *Streptococcus salivarius* was found more often in the caries-susceptible animals. Their data, however, do not permit an estimate of the quantitative difference in the flora of the two strains.

Cheyne[5, 6] has shown that in the rat a considerable increase in caries incidence occurs when the submaxillary and parotid glands are extirpated. This observation makes it seem that the presence of saliva has a caries-preventing effect. A similar conclusion for the human being had been reached by Weinmann[7] in 1936,

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Technical assistance was given by M. Hirsh and Mr. W. Winn (biological photographer). The starch used in this study was supplied by the American Maize Products Co. The animals were supplied through the courtesy of H. R. Hunt and C. A. Hoppert.

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who had further shown that not only the volume but also the proteolytic activity of saliva tended to be higher in caries-resistant patients than in caries-susceptible patients. It appears that, in the rat, parotid and submaxillary secretions contribute about the same degree of protective action,[8] contrary to the earlier observations of Cheyne, who thought that removal of the parotid gland alone did not affect caries activity.

For the two strains with which the present study is concerned, removal of the parotid gland alone or ligation of its duct was found to have no effect on caries susceptibility.[9] The effects of removing the submaxillary glands have not been studied.

The present study is concerned with the histologic characteristics and the enzymatic activity of the submaxillary gland in the two strains. The authors[10, 11] had previously demonstrated that extracts of the submaxillary glands of rats have considerable proteolytic activity as well as amylolytic activity. In rats, as in rodents generally, the parenchyma of the submaxillary gland consists of acini, intralobular ducts and excretory ducts. Cells of both acini and intralobular ducts have secretory characteristics. The proteolytic activity of the gland has been ascribed to the cells of the intralobular ducts and the amylase activity to the acini. It was thought that the difference in caries susceptibility of the two strains developed by Hunt and Hoppert might be related to differences in their submaxillary glands.

MATERIALS AND METHODS

Eight male rats of each strain, approximately 120 days old, were used in this study.

The animals were killed with ether, and the submaxillary gland was dissected free, placed in liquid nitrogen and then transferred to a Gersh-Altmann freeze-drying unit for lyophilization. An extract was made by grinding the finely cut frozen-dried gland in a mortar and slowly adding physiologic saline solution. Protease activity was determined using the method of Kunitz.[12] Amylase activity was determined using the method of Myers, Free and Rosinski.[13] Optimal pH was determined for both enzymes and used for assay. Saturating substrate condition was found possible to use for amylase activity. For protease activity, the enzyme activity varied with the square root of the extract concentration, and this relationship was used to express relative enzyme activities. The following conditions were used:

	Protease	*Amylase*
Substrate conc.	Casein 1%	Starch 0.65%
pH	9.6	7.0
Incubation time	30 min.	15 min.
Extract conc. (dry weight)	5 mg. per cc.	5 mg. per cc.

Nitrogen determinations were made according to the method of Ma and Zuazaga.[14]

The submaxillary gland of the opposite

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side was fixed in 10 per cent Formalin and examined histologically.

Pieces of pancreas were studied, using the same methods.

MORPHOLOGIC OBSERVATIONS

The dry weight of the glands in the susceptible strain was slightly higher than the dry weight of the glands in the resistant strain and represented a higher fraction of the total body weight. The ratio of dry weight of gland over total body weight ranged from 21 to 25 parts in 100,000 in the susceptible animals and from 15 to 23 parts in the resistant animals, averaging 23 and 19 respectively.

Morphologically, the gland of the susceptible strain had a higher proportion of intralobular duct tissue per unit area than the gland of the resistant strain. Both diameter and length of the ducts seemed larger in the susceptible animals. Furthermore, the cells of these ducts showed more pronounced signs of secretory activity. They were of columnar shape, with nuclei at the periphery, and the cytoplasm almost completely filled with large, spherical eosinophilic granules (illustration, left).

In the caries-resistant rats, the relative area occupied by the intralobular ducts was smaller. The cells making up the ducts were of low columnar or cuboidal shape, their nuclei were more centrally placed, and their cytoplasm contained fewer granules (illustration, right).

An estimate of the portion of the gland occupied by intralobular duct tissue was made in four animals of each strain. By the use of squared grid, the number of squares occupied by duct cells in a total of 1,080 squares was counted, and these area counts were converted to a volume estimate using the function $v=(\sqrt{a})^3$. The relative proportion of intralobular duct tissue varied as 19.96 ± 1.36 (in 216 cubes) to 6.68 ± 2.3 (in 216 cubes) for the susceptible and resistant animals respectively.

No differences could be seen in the acini of the two strains.

ENZYME ACTIVITY

Amylase • Amylase activity expressed as units of optic density per milligram of nitrogen averaged 0.36 ± .12 and 0.39 ± .09 for the susceptible and resistant rats respectively. The proportion of volume occupied by acini is probably just this much higher in resistant rats, as they have less intralobular duct tissue.

Protease • The relative activities for the proteolytic enzyme were 5.43 ± 0.46 and 1.00 ± 0.12 for the susceptible and resistant strains respectively.

Pancreas • The pancreas was found to be indistinguishable in the two strains with respect to both structure and enzyme activity.

DISCUSSION

This study has shown a difference with respect to relative weight, structure and function of the submaxillary gland in two inbred strains of rats which differ in their susceptibility to caries. The intralobular ducts of the susceptible animals occupied three times as large a portion of the total volume as did the ducts of the resistant rats. The protease activity of extracts of the submaxillary glands in the susceptible strain was five and a half times as great as that of extracts of the glands in the resistant strain. Junqueira,[15] in his study with mice, and Sreebny, along with others,[16] using rats, concluded that the probable site of proteolytic activity is in the cells of the intralobular ducts. The

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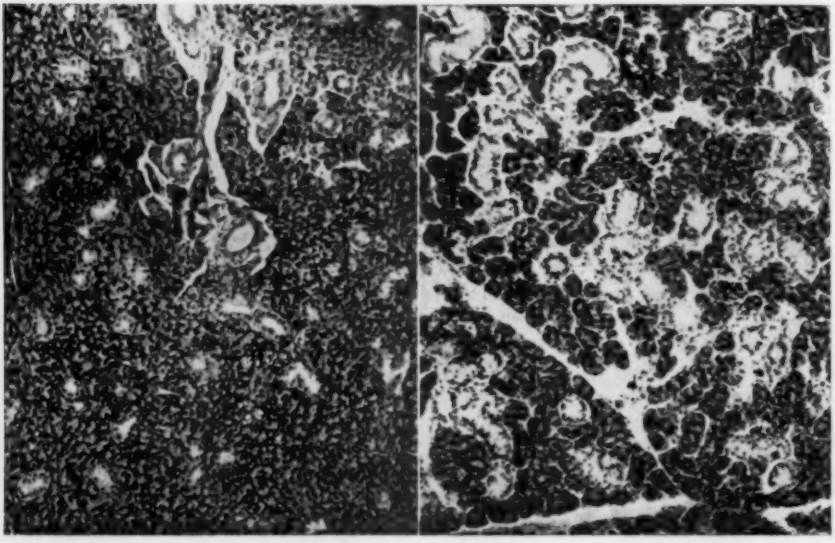
16. Sreebny, L. M., and others. Postnatal changes in proteolytic activity and in the morphology of the submaxillary gland in male and female albino rats. (Abst.) J. D. Res. 34:729 Oct. 1955.

larger amount of duct tissue per unit volume in the susceptible strain could largely account for most of the higher protease activity, and the larger number of granules seen in these cells, for the residual excess.

The protease activity in the susceptible strain is enhanced additionally by the greater relative weight of the gland in these animals. Although this difference is not great, it is large enough to allow for the excess amount of intralobular duct tissue in the susceptible animals. The fact that the pancreas in all aspects studied and the submaxillary gland in its amylolytic activity are alike in the two strains shows that the genetic difference is not a generalized difference in gland functioning. It seems as though the difference between the two strains specifically resides in an excess proliferation of the ductal elements with consequent excess proteolytic activity.

Contrary to the observations of Weinmann and of the authors investigating the effect of eliminating one or more of the salivary glands, higher proteolytic activity was found in the more caries-susceptible rather than the less caries-susceptible strain. Although this apparent discrepancy cannot be accounted for, the greater susceptibility associated with greater proteolytic activity can be accounted for in one of several conceivable ways.

It is generally agreed that dental caries is initiated by microorganisms of the bacterial plaque, which by their action on fermentable carbohydrates cause acid formation at the interface between plaque and tooth enamel. Although initiated by acid action, the carious process is thought to be propagated by the action of both acid-forming and proteolytic microorganisms. According to Hunt and Hoppert, the carious lesions in the susceptible strain of rats are clinically visible at approximately 70 days of age; in the re-



Intralobular duct tissue. Left: In caries-susceptible rats. Right: In caries-resistant rats

sistant rats they are visible between 400 and 500 days of age.

It is possible that the acid attack rate is greater in the susceptible rats because of the higher bacterial counts in this strain shown by Jay[3] and Rosen and others.[4] This quantitative difference in the bacterial flora may be independent of the submaxillary gland differences described in the present study, or may be mediated by better nutritive facilities for acid-producing bacteria provided by salivary proteolytic activity. In either instance, the bacterial differences, if shown to be quantitatively adequate, may account for earlier acid attacks.

It is also possible, however, that the two strains do not differ with regard to the time of onset of their initial acid attacks. The clinically visible differences in "caries time" may be due to conditions which accelerate the propagation of the carious lesions in demineralized areas in the susceptible strain. The proteolytic enzyme of the submaxillary gland may act directly or indirectly to speed up the process. Whether the protein material of enamel is susceptible to degradation by the submaxillary gland protease cannot be stated for the present. Even if this were found to be the case, the pH of the plaque would probably make direct proteolytic action of small significance. Indirectly, the protease of the gland might influence the composition of the oral flora by degrading ingested proteins to peptides and amino acids and thus favoring the development of proteolytic bacteria.

SUMMARY

Morphologic and biochemical characteristics of the submaxillary gland were examined in a strain of caries-susceptible and a strain of caries-resistant rats. The submaxillary gland in the caries-susceptible animal, although showing the same degree of amylolytic activity, had five times as high a proteolytic activity as the gland in the resistant strain and showed a larger proportion of intralobular duct tissue. It is felt that these observations might point to one of the mechanisms underlying the difference in caries susceptibility.

Imperfect Man • Man, at his best, remains a sort of unilateral animal, never completely rounded and perfect, as a cockroach, say, is perfect. If he shows one valuable quality, it is almost unheard of for him to show any other. Give him a head, and he lacks a heart. Give him a heart of a gallon capacity, and his head holds scarcely a pint. The artist, nine times out of ten, is a dead-beat and given to the debauching of virgins, so-called. The patriot is a bigot, and, more often than not, a bounder and a poltroon. The intellectual giant has bad kidneys and cannot thread a needle. In all my years of search in this world, from the Golden Gate to the Vistula in the East, and from the Orkney Islands in the north to the Spanish main in the south, I have never met a thoroughly moral man who was honorable. *H. L. Mencken, Prejudices: Fourth Series.*

Diagnostic aids and vital pulp therapy for deciduous teeth

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A carious pulp exposure in a deciduous or newly erupted permanent tooth causes perhaps as much anxiety and concern on the part of the dentist as any other problem in dentistry. In the past many dentists have had disappointing results when they have attempted to treat these carious pulp exposures. Too often they have used empirical methods, those based on observation rather than scientific reasoning.

Some members of the professon have found favor with a particular technic or drug and have attempted to use the same procedure in the treatment of all carious exposures. Although it is true that many procedures often bring excellent results in the treatment of carious exposures, they occasionally bring failures. In this paper several commonly used procedures will be discussed, and an attempt will be made to determine the merits of each by considering the clinical symptoms and histologic picture in vital pulp exposures.

CHOICES OF TREATMENT

When a vital pulp exposure is encountered in a deciduous or even a newly erupted permanent tooth, the dentist occasionally has as many as five choices of treatment.

Pulp Capping • The procedure of pulp capping has been widely practiced for years and is still a favored method of treating vital pulp exposures. Although it is condemned by some,[1,2] others[3,4] report that if the patients are carefully selected excellent results will be obtained.

Wittich[5] has reported success in capping deciduous pulps when certain conditions are present, such as (1) the absence of a toothache, with the possible exception of pain during mastication, (2) the presence of only a small exposure, and (3) pain and bleeding at the exposure site.

Rosenstein,[6] in extensive studies of deciduous pulp capping, has established the following criteria as clinical indications for pulp capping: (1) sensitivity of the pulp tissue at the exposure site, (2) slight hemorrhage from small exposures, and (3) dentin of light or normal color adjacent to the exposure.

It is generally agreed that when a pulp capping procedure is to be attempted all the caries must be removed from the tooth. If the amount of exposed pulp is small and is surrounded by sound, noncarious dentin, many have assumed that

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5. Wittich, H. C. Preliminary report on the use of capping preparations. North West Den. 31:194 Oct. 1952.

6. Rosenstein, S. N. Pulp capping in children's teeth. J.A.D.A. 39:658 Dec. 1949.

a suitable indication for the capping procedure is present.

The healthy pulp will survive and repair small injuries even in the presence of a few bacteria, the same as any other connective tissue. This defense mechanism should not be destroyed nor the healing process delayed by caustic chemicals or heat. There is no cautery or caustic substance that will destroy bacteria that will not also injure the tissue and some of its healing potential.[7] Only nonirritating solutions such as normal saline or chloramine solution should be used to clean the region and keep the pulp moist in preparation for the capping material.

Many capping materials have been used; however, the material which can be expected to best initiate repair of the pulp is calcium hydroxide.[8]

Pulp Curettage • Considerable attention has recently been given to pulp curettage, a method of treatment advocated by Chatterton.[9] When a carious exposure is encountered, he recommends that the tooth be isolated and all the carious dentin removed. Then a medium-sized round bur is inserted and revolved in the pulp tissue at the site of the exposure to remove any inflammatory, degenerating or necrotic pulp which has been in contact with the carious lesion. The hemorrhage is controlled, and the remaining normal pulp is capped with calcium hydroxide.

Pulpotomy or *Pulp Amputation* • Pulpotomy is a third method of treatment which should be considered in instances of vital pulp exposure whether the exposure is the result of trauma or caries. The justification for this procedure is that the coronal pulp tissue, the tissue adjacent to the carious exposure and showing evidence of inflammation and degenerative changes, can be removed and the healing process allowed to take place at the entrance of the pulp canal in a region of essentially normal pulp. After the pulp chamber has been thoroughly cleansed and débrided, a capping material that will stimulate repair of this tissue is placed over the newly formed blood clot. Recent reports[10, 11] indicate that the procedure is justifiable, but they stress the importance and need of the careful selection of cases.

Pulpectomy • Root canal therapy is occasionally indicated in the treatment of deciduous teeth if the pulp involved is extensive, if the canals are accessible and the child and parents appreciate this type of service. Though pulpectomy is more often indicated in permanent teeth, the procedure may be complicated because of the size or shape of incompletely formed root apexes.

Extraction • The removal of deciduous or newly erupted permanent teeth with carious pulp exposures may occasionally be the treatment of choice. When the child is uncooperative to the extent that one of the previously mentioned procedures cannot be carried out, then extraction is indicated. Extraction rather than pulp therapy is the treatment of choice, after proper premedication with antibiotics, in chronically ill children. The child with a history of a severe acute or chronic illness should not be subjected to even the remote possibility of an acute infection resulting from pulp therapy.

PULP DIAGNOSIS

Considerable work has been done in the field of clinical pulp therapy, but little has been done to aid in the selection of

7. Patterson, S. S., and Van Huysen, Grant. Treatment of pulp exposures. Oral Surg., Oral Med. & Oral Path. 7:192 Feb. 1954.

8. Glass, R. L., and Zander, H. A. Pulp healing. J. D. Res. 28:97 April 1949.

9. Chatterton, D. B. Pulp curettage. J.A.D.A. 45:462 Oct. 1952.

10. Teuscher, G. W. Preservation of the young tooth by the vital pulpotomy technic. Minneapolis Dist. D. J. 32:29 June 1948.

11. Strange, Evelyn M. Is vital pulpotomy worth while? J. Den. Children 20:38 2nd quart. 1953.

deciduous teeth suitable for vital pulp therapy. This fact is borne out in a statement by Reich,[2]

> . . . that the search for more and better materials to cover pulp tissue is futile unless a method is developed which will enable us to determine the extent to which pathologic changes have involved the pulp.

He states that too often dentists fail to evaluate properly symptoms such as a toothache; if there is a history of toothache of more than momentary duration, it is an indication that pulp involvement has progressed too far to allow for a successful pulp capping or even pulpotomy. Herbert[12] also believes that a history of pain is important in pulp diagnosis and that fairly definite symptoms of pain are usually associated with early, acute, inflammatory changes in the dental pulp.

Draker[13] has reported that the roentgenogram is no help in determining the histologic picture and pathologic changes in the pulp. Grossman[14] has stated that often in instances of acute abscess, periapical infection may be present yet no area of radiolucency may be seen in the roentgenogram.

Stephan[15] has made a correlation of clinical pulp testing with microscopic pathologic conditions in permanent teeth. He reported that it was difficult to diagnose the conditions of the pulp by the electric test. Even acutely inflamed pulps frequently gave an average response to the test; even in the case of a necrotic pulp, if the contents of the canals were liquid there was a response to the test.

Pulp testing of deciduous teeth apparently has not been studied or accepted as a diagnostic aid, perhaps because of the unpredictable reaction of the deciduous pulp and the apprehension on the part of the child to such procedures.

In the selection of deciduous teeth for vital pulp therapy the physical condition of the patient should also be considered since it may influence the healing potential of the pulp tissue. In experimental animals suffering from systemic disturbances, a degeneration of the odontoblasts was noted by Glickman and Shklar,[16] who assumed that this degeneration would ultimately cause a disturbance in the formation of new dentin.

METHOD

An attempt was made to evaluate the clinical aids which are commonly used to establish the suitability of a deciduous tooth for vital pulp therapy. This evaluation was accomplished by attempting to make a correlation of clinical and microscopic observations in carious exposures of vital deciduous pulps.

The material for this study consisted of 40 vital deciduous teeth with carious pulp exposures. The children were selected from a group that came to the clinic desiring only extraction of the carious tooth or those who manifested a history of a systemic disturbance which would contraindicate any type of therapy other than prophylactic preoperative procedures and extraction of the teeth.

A roentgenogram was taken of the deciduous tooth with the suspected carious exposure. From an examination of the roentgenogram it was possible to estimate the proximity of the carious lesion to the pulp horn and also to note any deviation from normal within the pulp chamber and canals.

An electric pulp test was made of the carious tooth as well as the adjacent teeth. The tooth was then anesthetized, isolated with the rubber dam and all the carious tooth structure removed.

12. Herbert, W. E. Correlation of the clinical signs and symptoms and histological condition of the pulps of 52 teeth. Brit. D. J. 78:164 Mar. 16, 1952.

13. Draker, H. L. Diagnostic aids in pulp therapy. New York D. J. 16:15 Jan. 1950.

14. Grossman, L. I. Diagnosis and treatment of diseases of the pulp and periapical tissues. Am. J. Orthodont. & Oral Surg. (Oral Surg. Sect.) 30:528 Sept. 1944.

15. Stephan, R. M. Correlation of clinical tests with microscopic pathology of the dental pulp. J. D. Res. 16:267 Aug. 1937.

16. Glickman, Irving, and Shklar, Gerald. Effect of systemic disturbances on the pulp of experimental animals. Oral Surg., Oral Med. & Oral Path. 7:550 May 1953.

The clinical appearance of the exposed pulp including the size of the exposure or exposures, the amount of hemorrhage and the presence of any exudate were recorded. Only teeth which apparently had vital tissue at the exposure site were included in the observation group. The teeth were extracted and placed in 10 per cent Formalin for fixation. After decalcification of the teeth, histologic sections were prepared for microscopic examination.

OBSERVATION

A variety of reactions to the electric pulp test was observed. Many of the teeth which gave a normal response demonstrated on histologic examination advanced inflammatory or degenerative changes within the pulp tissue. In only two instances, where pulpal hyperemia and inflammation were later observed, was a hypersensitive test reaction noted. On the other hand in two essentially normal pulps there was no reaction to the electric test.

In this study it was not always possible to determine accurately the proximity of the carious lesion to the pulp by roentgenographic means. What often appeared roentgenographically to be an intact barrier of secondary dentin, protecting the pulp, was actually a perforated mass of irregularly calcified and carious material. Beneath this could often be seen an advanced state of inflammation. An example of this was seen in a first deciduous molar with a history of spontaneous toothache in the region. In the roentgenogram there appeared to be an intact secondary dentin barrier protecting the pulp in the first deciduous molar (Fig. 1, left). On removal of the caries a small exposure was observed. In the photomicrograph can be seen an advanced state of inflammation throughout the pulp (Fig. 1, right).

Of considerable diagnostic importance was the roentgenographic evidence of calcified masses within the pulp chamber. Zander[17] has reported that if the irritation to the pulp is relatively mild and chronic, the pulp will respond with inflammation and tend to eliminate the irritation by blocking with irregular dentin those tubules through which the irritative factors are transmitted. If the irritating agent is intense and acute and if the carious lesion is developing very rapidly, this defense mechanism may not have a chance to lay down the secondary dentin barrier and the disease process may reach the pulp. In these instances the pulp will tend to erect a barrier at some

17. Zander, H. A. Rationale for diagnosis and treatment of pulp diseases. J. Florida D. Soc. 18:14 Nov. 1947.

Fig. 1 • First deciduous molar. Left: What appears to be intact protective barrier is perforated mass of carious material. Right: Note necrotic tissue at exposure site as well as advanced state of inflammation throughout pulp

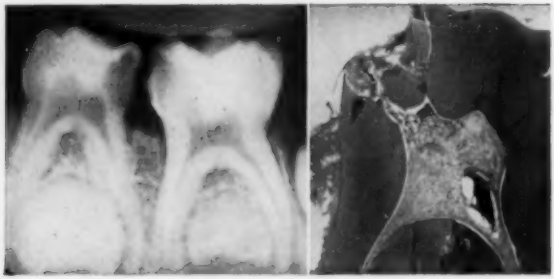


Fig. 2 • Second deciduous molar. Left: Calcified mass evident in mesial pulp horn, associated with advanced state of degeneration and inflammation of tissue in canals. Right: Diffuse calcification evident in region of exposure. Note inflammation throughout pulp tissue and abscess at entrance to distal pulp canal

distance from the exposure site. These calcified masses were often evident in the pulp horn or even in the region of the pulp canal entrance. In Figure 2, left, a calcified mass is evident in the mesial pulp horn of a second deciduous molar. There was no history of a toothache and there was a normal response to the electric pulp test. In the photomicrograph can be seen a region of diffuse calcification beneath a large carious exposure. This is accompanied by considerable inflammation in the mesial and distal canals and a pulpal abscess (Fig. 2, right).

In Figure 3, left and center, can be seen a calcified mass at the entrance to the pulp canal of a deciduous molar. The pulp tissue in the region and in the mesial canal demonstrates advanced inflammation. Unlike pulp stones, the masses appeared as irregular amorphous masses of calcified material which showed an affinity for hematoxylin. Histologically they bore no resemblance to dentin or the dentin barrier. In every instance they could be associated with advanced degenerative changes of the coronal pulp and inflammation of the tissue in the canals. In this instance as in several others, although not evident roentgenographically, the advanced degenerative process was accompanied by internal resorption (Fig. 3, right).

It became evident in this study that deciduous pulps even in advanced stages of degeneration often did not present definite clinical symptoms of pain. A history of a toothache, other than the type of pain associated with eating, was the exception in the 40 teeth studied. In five of the 40 instances of carious pulp exposure, however, there was a history of a spontaneous-type pain; this pain was associated with advanced pulp degeneration. In three instances there was a history of toothache at night and in each instance there was also a pulpal abscess or an extensive inflammatory reaction. In the roentgenogram in Figure 4, left, can be seen what appears to be a carious exposure in a tooth that had ached after meals and at night. The photomicrograph demonstrates attempted repair at the exposure site and inflammation of the pulp tissue in the entire chamber (Fig. 4, right).

In Figure 5, left, is a roentgenogram of a second deciduous molar that ached only at mealtime. The tooth responded normally to the pulp test. There was a carious exposure and inflammation of the pulp; however, the process was localized

to the area of the pulp horn (Fig. 5, right).

The size of the exposure, the appearance of the pulp and amount of bleeding seemed to be perhaps the clearest diagnostic considerations in the case of the deciduous teeth. The pinpoint exposure, which became evident after all the involved dentin had been removed, histologically demonstrated the most favorable conditions for pulp therapy (Fig. 6). Even the smallest exposure, or in some instances perhaps the mechanical exposure, however, was accompanied to some extent by the infiltration of inflammatory cells and a degenerative process. The large exposure which became evident after the removal of a mass of leathery dentin was accompanied by degeneration, the extent of which would contraindicate any type of vital pulp therapy. In Figure 7, left, can be seen a roentgenogram of a second deciduous molar with a pulp exposure which became evident after the removal of a mass of leathery dentin. In the photomicrograph can be seen degenerative changes at or beyond the area of convenient pulp amputation (Fig. 7, right). In this kind of exposure the hemorrhage was often preceded by a serous exudate. Occasionally even a rather small exposure would bleed profusely. This condition was found to be associated with extensive inflammation and hyperemia of the pulpal tissue.

SUMMARY

A variety of adverse reactions has been noted in critical roentgenographic appraisals of pulp therapy. Reactions such as internal resorption, pathologic root resorption, calcific degeneration of the pulp and complete or partial pulp degeneration accompanied by apical radiolucency have often been noted months or years after the vital pulp therapy.

Those who have been critical of their results from pulp capping, pulp curettage and pulpotomy over a long period of clinical observation no doubt have noted a rather high percentage of failures of one kind or another. Since these failures have rarely been manifested by acute symp-

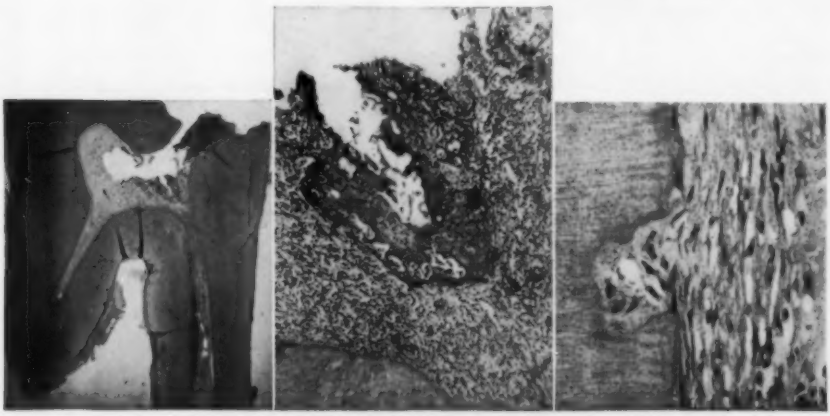


Fig. 3 • Left: Photomicrograph of deciduous molar with large carious exposure. Note calcified mass at entrance to pulp canal. Center: Higher magnification of irregular amorphous mass of calcified material surrounded by pulp tissue with advanced inflammation. Right: Internal resorption beginning in a pulp canal

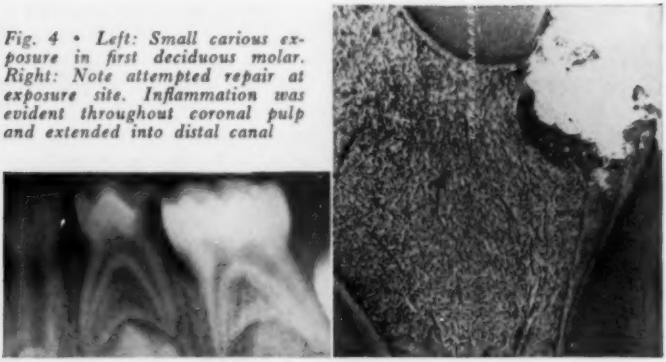


Fig. 4 • Left: Small carious exposure in first deciduous molar. Right: Note attempted repair at exposure site. Inflammation was evident throughout coronal pulp and extended into distal canal

toms, they have frequently been overlooked.

It became evident in this study that many failures in pulp therapy apparently had been due to early degenerative changes which were either overlooked or could not be detected at the time of the operation.

After reviewing the roentgenograms, the histories and the microscopic picture of the 40 deciduous teeth, it seems logical to make the following statements: Pulp capping should in general be limited to the mechanical or pinpoint carious exposures of the pulp. Although the extent to which inflammation can be present in the pulp, yet have the pulp recover and undergo repair, is not known, it is assumed that pulps demonstrating a diffuse type of inflammation will, over a period of time, undergo degenerative changes. Some believe that unless the pulp is exposed mechanically under strict aseptic conditions the capping of the exposure must be regarded as a deliberate enclosure of infection within the pulp chamber.

Pulp curettage theoretically can be

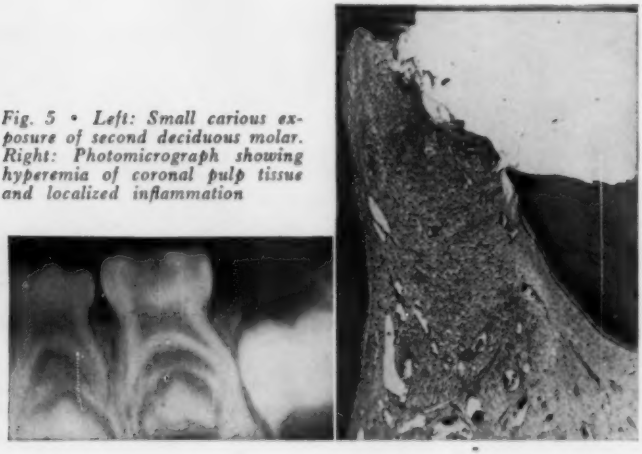


Fig. 5 • Left: Small carious exposure of second deciduous molar. Right: Photomicrograph showing hyperemia of coronal pulp tissue and localized inflammation

successful in carefully selected cases, and good results after this procedure have been reported. It is, however, often impossible to predict the extent of the degenerative changes in the pulp tissue by known methods, which is of course necessary in order to experience success in this type of treatment.

Pulpotomy seems to be the treatment of choice in instances of carious pulp exposure in deciduous and newly erupted permanent teeth. Even if this procedure is to be followed and reasonable results are to be expected, there must be a careful selection of the cases; pulpotomy should not be attempted merely because there is bleeding and apparently vital pulp at the exposure site.

Fig. 6 • Histologic section of tooth with pinpoint carious exposure. Note slight amount of inflammation localized to exposure site

CONCLUSIONS

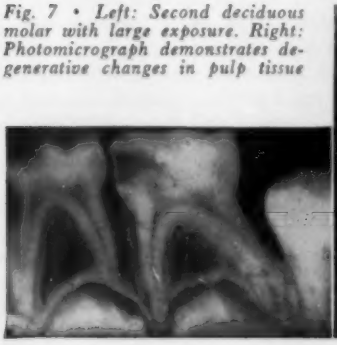
1. The success in vital pulp therapy for deciduous teeth depends on accurate preoperative diagnosis and a consideration of the physical condition of the child.

2. Present-day methods of electric pulp testing are not reliable in predicting early inflammatory and degenerative changes in the pulp.

3. The roentgenogram will not always provide reliable information regarding the proximity of the carious lesion to the pulp tissue nor will it show early periapical infection in deciduous teeth. The roentgenogram is, however, a valuable diagnostic aid since evidence of calcified masses in the pulp horn, adjacent to the carious lesion or at the entrance of the pulp canal, is an indication of advanced pulpal degeneration.

4. The absence of a toothache cannot be used as a criterion for deciduous pulp therapy. A toothache at night, or the spontaneous kind other than that associated with eating, should be considered evidence of degenerative changes in the pulp.

Fig. 7 • Left: Second deciduous molar with large exposure. Right: Photomicrograph demonstrates degenerative changes in pulp tissue



5. Pinpoint carious exposures may be associated with a mild and probably reversible type of inflammation. Large carious exposures with or without a serous exudate are associated with degenerative changes often down in the pulp canals, and occasionally microscopic evidence of internal resorption can be obtained.

6. Profuse hemorrhage from an exposed pulp is evidence of extensive inflammation and hyperemia and a contraindication for any type of vital pulp therapy.

7. The age of the patient may be an important consideration in pulp diagnosis.

8. Children with a chronic illness or a lowered resistance should not be considered for vital pulp therapy; infection is a remote possibility.

9. One procedure should not be adapted to all vital exposures in deciduous teeth. The decision whether the desired result will be derived from pulp capping, pulp curettage, pulpotomy or extraction should be based on a careful analysis.

Methods of feeding infants with cleft palates

Jacob C. Lifton, D.D.S., New York

A newborn infant with a cleft palate and with or without a cleft lip is severely handicapped. Because the basic oral and contiguous structures of such an infant differ radically from the normal, it cannot be fed as are other infants. Cleft palate involvement varies. All categories, however, produce a common challenging problem—the extremely difficult one of feeding. It is well to bear in mind that normal infants also may present difficult nursing problems. Babies may have infections, and their desire for food may diminish. Some are lethargic, lack animation or are feeble. Some are not inclined, or do not have the power, to suck. Especially is this true in premature or underweight babies.[1,2] These same conditions may further complicate the cleft palate feeding difficulty.

The normal baby has a full hard and soft palate which enables him to breathe while sucking. The components of the lip and hard and soft palates have formed and united before birth. The normal structure of the skull has formed *in utero*. This can be demonstrated by a roentgenogram in anteroposterior projection of the abdomen of a woman in which a full-term fetus is shown (Fig. 1). The hard palate separates the oral and nasal cavities and forms both the roof

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1. Holt, L. E., Jr., and McIntosh, Rustin. Holt pediatrics, ed. 12. New York, Appleton-Century-Crofts, Inc., 1953, p. 152.

2. Marriot, Williams McKim. Infant nutrition. Textbook of infant feeding for students and practitioners of medicine. St. Louis, C. V. Mosby Co., 1930, p. 119, 139, 169, 262.

of the mouth and the floor of the nose. The nasal septum divides the left and right nasal chambers. While it is in the uterus, the fetus is nourished through the placenta. After birth, the nutritional requirements can be supplied directly by the mother through breast feeding. If the human milk is inadequate in amount or quality, or must be discontinued for any reason, milk formula may be substituted for breast milk, and the infant can be bottle-fed.[3] The infant with an anatomically deficient palate, however, is unable to suck directly. Breast feeding must be utilized indirectly, or the infant must forego breast feeding and be artificially fed.

Glass nursing bottles with nipples are manufactured for artificial feeding. Some manufacturers make specially shaped bottles with specially shaped nipples. The small rubber nipple, preferably with three small openings in it, is of special interest. In response to tongue pressure against the palate during the sucking action, the fluid formula in the bottle will spray from the nipple. At the same time, the additional openings provide for the necessary inflow of air into the bottle. This inflow prevents the formation of a vacuum in the bottle, which would produce a collapsed nipple; the infant would then swallow air rather than milk.

Infants vary as to the intensity of the sucking reflex. Nipple openings must be adjusted to the baby's sucking capacity. A weak reflex necessitates slightly larger nipple openings; otherwise, the energy expended only exhausts the infant without providing a spray containing necessary nutrients for growth, development and energy.

An infant with a cleft palate can be fed with a large rubber nipple with openings of sufficient size to permit the formula to be expressed in fine sprays or drops. The openings must not be so large, however, that they permit the milk to flow in a continuous stream. To compensate for its palatal deficiencies,

Fig. 1 • Anteroposterior view of skull of fetus at full term still in abdomen. Nasal chambers are shown divided by vomer. Roof of mouth and floor of nose are completely formed

the infant may avoid the cleft or push the nipple onto the hard, bony palatal segment and with its tongue suck the milk from the bottle. It may manage to close off the nasopharynx with its tongue and thereby prevent liquids from entering the nasal fossa. All that may be necessary to aid the infant is to hold it in an upright or semiupright position, so that the swallowed air can be expelled during the feeding process.[2]

Many feeding devices have been recommended, such as the bulb syringe type, using a Breck feeder; special rubber nipples with a soft flange, such as the Brophy cleft palate nipple,[4] and individually constructed obturators or dental plates.[5] For infants who cannot or will not suck, tube feeding (*gavage*) using a narrow rubber catheter tubing

3. Ellis, R. W. B., editor. Child health and development. London, J. & A. Churchill, Ltd., 1949, p. 49, 89-109.

4. Brophy, T. W. Cleft lip and palate. Philadelphia, P. Blakiston's Son and Co., 1923, p. 283.

5. Hardy, E. A. Dental aspects of cleft palate. D. Survey 13:165 Feb. 1937.

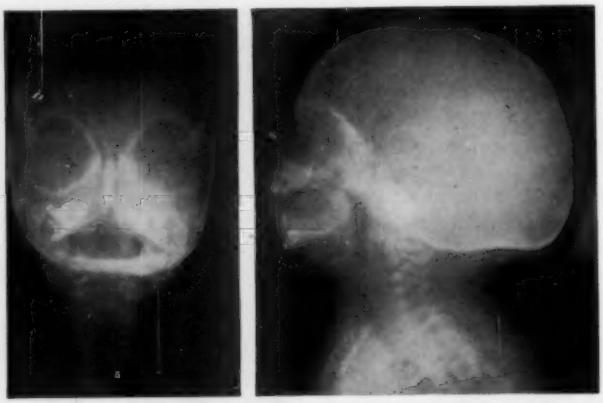

Fig. 2 • Case 1. Two week old infant girl. Left: Anteroposterior view. Note cleft of hard and soft palate. Right: Profile view. Note continuous maxillary alveolar process. Vomer joined to palatal process of maxilla

or plastic (polyethylene) tubing has been beneficial. Regardless of the extremity of the feeding method, proper nutrition must be maintained, as a baby must receive nourishment if he is going to survive.

An individually constructed obturator, preferably of acrylic resin, is indicated where the sucking reflex can be stimulated. The obturator mechanically seals off the nasal cavity and provides a hard oral vault against which the rubber nipple can be compressed. It is only a temporary nursing adjunct. It is processed from a cast made from an impression of the cleft. The extent and involvement of the fissure on the osseous framework of the hard palate and the division of the muscles of the soft palate determine the design of the obturator.

REPORT OF CASES

Clefts will be described involving the hard or soft palate or both, single or double division of the alveolar process and extension of the hard palate through the soft palate.

Case 1 • In clefts of the hard and soft palates only, or in clefts of the soft palate only, there is no facial deformity. The infant's appearance at birth is normal. The premaxilla is continuous with the adjacent palate. The alveolar process is U-shaped. The vomer may be totally or partially intact. The vomer joins the palatal process of the maxilla, where the hard palate terminates and the cleft begins (Fig. 2). When the infant is born, the cleft may not be recognized until milk escapes from the nose or the baby fails to regain its birth weight.

A baby girl was born with a cleft of the hard and soft palate. The gestation period had been 40 weeks. When the patient was seen at five days, her weight was 4 pounds 10 ounces. The anterior third of the hard palate was intact, and the alveolar ridge was continuous. There was a 2 cm. longitudinal cleft. The soft palate was divided but definitely discernible. The oral and nasal cavities were joined, and they connected with the pharynx to form a single cavity. The base of the vomer joined the median maxillary ridge behind the anterior suck-

ing pads and above the alveolar process to form the septum. Feeding was difficult; therefore, an obturator was indicated as a nursing aid.

Construction of Obturator[6] • An impression tray was made from an aluminum measuring spoon, contoured to approximate the shape of the hard and soft palates (Fig. 3, above left). The baby was held upright by the nurse. The sterilized tray was tried in the mouth. Under aseptic conditions, the tray was filled with sufficient softened low-heat compound impression material, introduced into the mouth and gently pressed into position. The baby began to suck immediately. The movement of the soft palate on the soft compound produced a muscle-trimmed impression. (If the baby does not suck, the obturator probably will not fit.) The compound hardened in a few minutes. The impression then was removed. It outlined clearly the hard and soft palates (Fig. 3, above right).

The impression was poured in artificial white stone (Fig. 3, below left). The nasal cleft portion of the cast was filled in with colored stone (to differentiate between the cast and fill-in) from the level of the median border of the hard palate to the attachment of the divided soft palate. This procedure was done to eliminate any possible plunger action of the plastic bulb in the bony cleft, as the bulb tends to widen the cleft. It is my practice to shape the vault to the normal conformations of the roof of the mouth. The prepared stone cast is waxed to the posterior margin of the divided uvula which is almost to the posterior wall of the pharynx. A small suture eyelet is made in the wax in the median line over the anterior ridge. The obturator is processed in acrylic resin similarly to a Hawley retainer, finished and polished (Fig. 3, below center). As a safety precaution before feeding, a heavy black cotton suture is passed through and tied to the eyelet (Fig. 3, below right).

Use of Obturator • The obturator was inserted a few minutes before feeding time. The nipple was placed above the tongue of the infant, and she was encour-

6. Lifton, J. C. Orthodontics in the treatment of cleft palate. Am. J. Orthodont. & Oral Surg. 27:423 Aug. 1941.

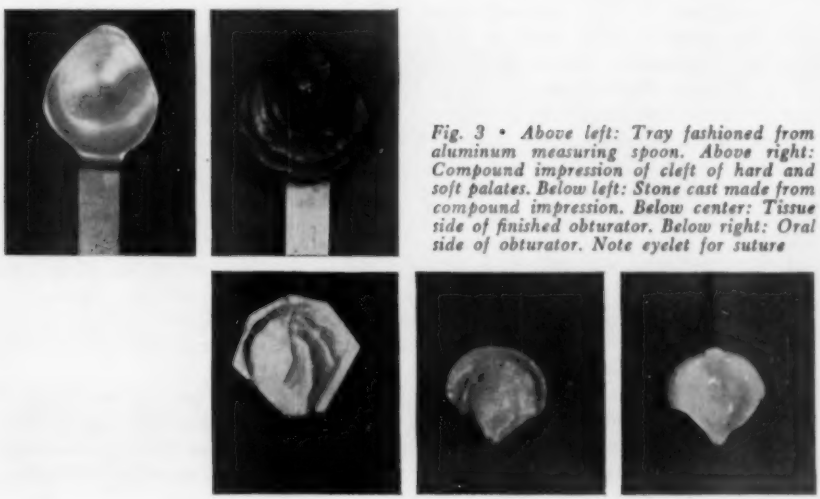

Fig. 3 • Above left: Tray fashioned from aluminum measuring spoon. Above right: Compound impression of cleft of hard and soft palates. Below left: Stone cast made from compound impression. Below center: Tissue side of finished obturator. Below right: Oral side of obturator. Note eyelet for suture

Fig. 4 • Case 2. Left: Cast of cleft of posterior third part of hard and soft palate of ten day old patient. Center: Tissue side of obturator. Note bulb in soft palate region. Right: Lingual side of obturator

aged to suck. When the infant became tired, she was given a rest and allowed to burp, the obturator being kept in place until the baby had completed the nursing and had burped. With the aid of the obturator, the feeding process was simplified and no unusual effort was necessary.

The infant gained weight consistently. Because of palatal growth, a new obturator was constructed in about five weeks. When the baby had gained 1 pound 14 ounces, reaching a weight of 6 pounds 8 ounces, she was discharged from the hospital.

Case 2 • A baby boy was seen when he was ten days old. The mother's blood was Rh negative. The baby at birth weighed 8½ pounds. There was a cleft of the posterior third of the hard palate and the entire soft palate. An impression was taken in low-heat compound and poured in artificial stone (Fig. 4, left). A relief was placed on the cast at the periphery of the hard palate where the cleft began. The cast was waxed, and an eyelet was made in the anterior median line.

The obturator was processed in acrylic resin, and completed (Fig. 4, center and right), and used as a nursing adjunct. The baby learned to suck and, within a short period, was able to take the bottle as well as would a normal baby. The use of the obturator was then discontinued, and the baby was discharged from the hospital.

Case 3 • Parents of an infant with a cleft palate need assurance that the child can be benefited. This assurance in itself, however, is not sufficient. Some concrete action is needed to encourage the distraught parents. The construction of a nursing adjunct is a positive factor.

A baby boy weighing 6 pounds at birth had lost 11 ounces during the first week of his life. He had a normal facial appearance, but an examination revealed a cleft of the hard and soft palates (Fig. 5, left), which partly explained the loss of weight. It was believed that an obturator would aid the infant in sucking and reduce the feeding difficulty. Accordingly, when the baby was two and a half weeks old, an impression was taken of its mouth and an acrylic obturator was constructed. The completed obturator was used in conjunction with the regular nipple and milk bottle for feeding (Fig. 5, center). The obturator served its purpose well, reducing the time required for nursing. The mother was taught the use and care of the obturator. Because of the growth of the baby's mouth, the obturator was replaced after two months' use.

At six months of age, the baby weighed 11 pounds; normally, a baby should have doubled its weight at that age. Although the obturator could have been discarded,

this was not done because of the summer heat. The anterior segment was ground, however, to permit the eruption of deciduous incisors (Fig. 5, right). When the weather became more tolerable, the use of the obturator was discontinued gradually. The child's weight was 17½ pounds at 14 months of age, at which time he was doing well without any special appliances.

Case 4 • A complete cleft of the hard palate involves a cleft of the alveolar process, unilaterally or bilaterally. It may be associated with an incomplete cleft lip, or a complete unilateral cleft of the lip and hard and soft palates, or a bilateral cleft of the lip and hard and soft palates. In complete unilateral cleft of the lip and hard and soft palates, the premaxilla is divided at the premaxillary suture, and the fissure continues in the midline of the palate through the hard and soft palates. The palatal plate on the affected side will be narrower laterally than on the opposite side. The septum will be joined to the palatal process on the wider or normal side (Fig. 6, left).

A baby girl was born with a complete unilateral cleft of the lip and hard and soft palate. She weighed 5 pounds 13 ounces at birth. The anatomic variation was obvious with the cleft of the lip on the right side in line with the premaxillary suture, instead of the usual fissure on the left side. The cleft divided the alveolar process, with the large left segment terminating anterior to the narrower right palatal plate (Fig. 6, center). The cleft continued pharyngeally in the midline through the entire hard and soft palate.

An impression of the baby's mouth was taken in low-heat compound and was poured in stone. Only the fissure in the alveolar process and the hard palate was filled in to a level consistent with the general palatal conformation. After the obturator was completed, however, the mother indicated a preference for the Brophy cleft palate nipple[4] (Fig. 6, right). Her desires were encouraged. It must be borne in mind that the acrylic obturator is only a nursing aid, intended to develop the sucking reflex and facilitate feeding of the infant. Any method accomplishing these purposes is worthwhile. Furthermore, the aim is to wean the baby from the obturator before surgical repair is attempted. It is not desirable to superimpose the shock of lip surgery on the adjustment accompanying

Fig. 5 • Case 3. Left: Two week old infant with cleft of hard and soft palate. Center: Obturator in place with regular nursing bottle and nipple. Note suture attached to eyelet in obturator with free end wound around finger of nurse. Right: Infant at six months. Deciduous incisors about to emerge and permanent incisors developing. Note continuous alveolar process

Fig. 6 • Case 4. Left: Six week old infant with complete unilateral cleft of lip and hard and soft palates. Note especially cleft of right side. Vomer attached to left palatal process of maxilla. Center: Same infant as shown at left. Note overlapping large left segment. Right: Cleft palate nipple

changes in feeding habits. This mother's resourcefulness and the excellent nursing care she gave the baby were all that were necessary for the patient to gain in weight, growth and energy. The infant gained 2 pounds 3 ounces to become a good surgical risk.

Case 5 • In bilateral clefts of the lip and cleft of the hard and soft palates, the premaxilla protrudes beyond the face and extends forward like a stalk or peninsula, supported by a varying length of the vomer (Fig. 7). The alveolar process is separated on both the right and left sides along the lines of the premaxillary suture. Continuing posteriorly, the maxilla is separated in the midline by the fissure between the palatal processes. The vomer does not join the horizontal processes of the maxilla.

A baby girl was born with a bilateral cleft of the lip and hard and soft palates (Fig. 8, left). She weighed 5 pounds at birth. Although the patient was fed through a plastic (polyethylene) tube, she lost 8 ounces within a week.

An impression of the cleft was taken in a low-heat compound from which a stone cast was made. The space representing the cleft interval between the premaxilla and the horizontal plates of the maxilla was filled in to restore the oral vault pattern and to prevent any bulk of obturator material from intruding into the nasal cavity. The cast was waxed, covering the premaxilla and horizontal palatal segments, and an eyelet was made in the median line of the premaxillary segment. The obturator was processed and completed in acrylic resin (Fig. 8, right), and replaced the polyethylene *gavage* tube. The patient gained weight. When her weight was 5 pounds 11½ ounces, she was transferred to another hospital for plastic repair of the cleft lip.

Median Cleft • A median cleft of the lip and hard and soft palates is rather rare. In this anomaly, the premaxilla is absent; therefore, bony support for the external nose is lacking. The cleft is in the midline and extends posteriorly between the hard and soft palates; it resembles the bilateral cleft palate in bony archi-

tecture. A case involving this defect has been described previously.[7]

Case 6 • The presence of a congenital cleft should alert the dentist to search for other abnormalities. Deviation from the normal in regard to the oral cavity, palate, mandible, tongue or contiguous structures will complicate the feeding problem resulting from the cleft.

Disturbing and discouraging consequences accompany congenital glossoptosis. In this condition the tongue falls back into the pharynx, causing respiratory difficulties, cyanosis and a blocking of the food passages. The condition is attributed to a hypoplasia of the mandible and foreshortening of the genioglossus muscle.[8] It is described in the literature under the name Pierre Robin syndrome, and is associated with hypoplasia of the mandible, or micrognathia, hypomicrognathism and birdface.[9-14]

A five week old baby girl was admitted to the hospital for investigation of glossoptosis. There was a cleft of the hard and soft palate (Fig. 9, left). The mandible was normal in shape, but the chin was retruded. There seemed to be evidence that the tongue had been tied to the lip and had pulled away. The birth weight of the infant was reported as 5 pounds 4 ounces. She had frequent episodes of cyanosis, and experienced difficulty in feeding. Anteroposterior and lateral roentgenograms of the skull showed the same maxillary defects as are usually seen in clefts of the hard and soft palates only. The mandible appeared to be micrognathic (Fig. 9, center and right).

Fig. 8 • Case 5. Left: Infant at age of eight days, with bilateral cleft of lip and hard and soft palate. Right: Acrylic obturator embracing all separated segments. Note black suture attached to oral eyelet

Fig. 7 • Ten day old infant with complete bilateral cleft of lip and hard and soft palate. Projecting premaxilla is joined to vomer and lateral maxillary plates are free

7. Lifton, J. C. Orthodontic procedures in gross dentofacial malformations. Am. J. Orthodont. & Oral Surg. 33:325 June 1947.

8. Llewellyn, J. S., and Biggs, A. D. Hypoplasia of mandible; report of case, with resumé of literature and suggestions for modified form of treatment. Am. J. Dis. Child. 65:440 March 1943.

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10. Robin, Pierre. Glossoptosis due to atresia and hypotrophy of the mandible. Am. J. Dis. Child. 48:541 Sept. 1934.

11. Nisenson, A. Receding chin and glossoptosis; cause of respiratory difficulty in the infant. J. Pediat. 32:397 April 1948.

12. May, Hans, and Chun, Lin T. Congenital ankyloglossia (tongue-tie) associated with glossoptosis (retruded mandible) and palatum fissum (cleft palate). Pediatrics 2:685 Dec. 1948.

13. Eley, R. C., and Farber, S. Hypoplasia of mandible (micrognathy) as a cause of cyanotic attacks in the newly born infant; report of 4 cases. Am. J. Dis. Child. 39:1167 June 1930.

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An impression was taken of the patient's mouth, and a stone cast was made on which an acrylic obturator was completed. After the obturator had been used as an aid to feeding, the patient improved and was discharged three weeks later, weighing 6 pounds 6 ounces. She was seen in the follow-up clinic weekly for six weeks. On her last visit she was perfectly well. Three days later, however, she developed a cough, without catarrh or fever, and there were frequent episodes of vomiting. A week later her mother noticed increased respiratory difficulty and cyanosis, and the infant was immediately readmitted to the hospital. In spite of all efforts to help her, the patient died of pneumonia at the age of four months.

Case 7 • A baby boy was seen at the age of seven days. The gestation period was 40 weeks. His weight at birth was 5 pounds 14 ounces. He appeared unwell and often refused to take the bottle. He frequently became cyanotic while being fed and swallowed his tongue. A thorough examination of his mouth revealed a cleft of the soft palate only. A lateral roentgenogram of the skull showed the mandible to be of usual size and conformation (Fig. 10, above left). An obturator was planned as a possible aid because of the feeding difficulty. An impression was taken in low-heat compound, a cast was made (Fig. 10, above center) and an acrylic obturator processed (Fig. 10, above right). The baby was able to take its formula from the bottle, but regurgitated the milk.

Even with the obturator, the infant occasionally became cyanotic during feeding. An effort was made to relieve the condition by combining the obturator with a recess to hold the regular nipple. Because the hard palate was intact there was a surface against which the nipple could be compressed with the tongue. A soft plastic obturator was indicated.

Accordingly, another impression was taken and a cast was made, as previously described. A soft plastic appliance was constructed with a soft loop of the same material to encircle the base of the nipple. The baby took well to the soft obturator fitted over the nipple (Fig. 10, below center and right), and gained weight as the result of the maintenance of adequate nutrition. He was no longer cyanotic during feeding, and was considered to have improved when he was discharged.

The infant born with a cleft palate is an immediate challenge to the healing

Fig. 9 • Case 6. Left: Cleft of hard and soft palate in five week old girl with glossoptosis. Center: Profile view showing micrognathic mandible. Right: Anteroposterior view showing hard palate and continuous alveolar process

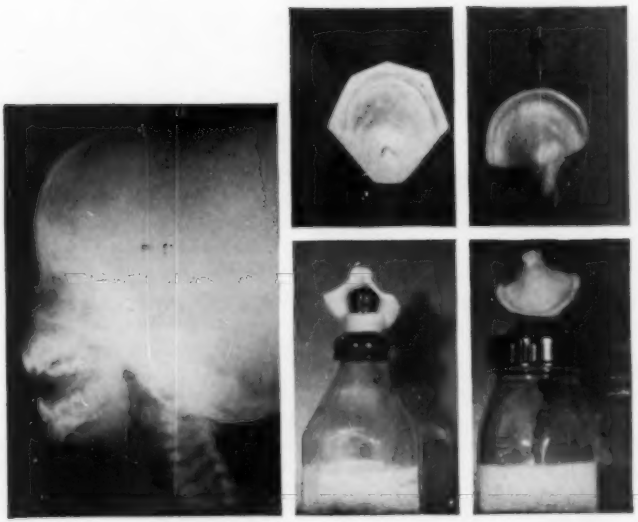

Fig. 10 • Case 7. Left: Lateral view of infant with glossoptosis. Mandible of normal conformation and size. Above center: Cast of soft palate. Above right: Acrylic obturator. Below center and right: Soft obturator made from cast for cleft of soft palate only, with encircling band, engaging nipple mounted on nursing bottle

professions. Nutrition must be provided without delay in order that the infant may live and grow strong. The medical, dental and nursing professions through their coordinated effort can facilitate normal oral functions, at the earliest stages of the problem.

SUMMARY

1. The infant with a cleft palate cannot be fed as other infants are because its basic oral and contiguous structures differ radically from the normal.

2. The difficult feeding problem may be aggravated by common nursing difficulties.

3. Many methods of feeding have been used with varying benefits.

4. Feeding is the immediate problem for infants with all kinds of cleft palates.

5. Feeding can be facilitated with the use of an obturator which is made from an impression of the individual mouth. The obturator serves well in stimulating a good physiologic sucking reflex.

6. The presence of a congenital cleft should alert the dentist to search for other abnormalities. Disturbing and discouraging consequences accompany congenital glossoptosis.

7. Whether the feeding method must be extreme, the infant must receive nourishment in order to live and grow.

8. The problem of the infant with a cleft palate can be solved through the coordinated efforts of the medical, dental and nursing professions.

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Facial injuries: a common denominator of automobile casualties

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Despite the admirable efforts and achievements of persons concerned with accident prevention, the continuing daily toll of life and limb from motor accidents demands additional and coordinated methods of preventing or moderating injuries.

Interest in moderation of the injuries has been greatly accelerated recently, chiefly because of the activities of those in the automotive industry and others who have the so-called human engineering and crash-impact engineering points of view. As might be expected, the most elusive elements in this problem of automobile accidents are the human ones, primarily because of the lack of valid medical data, both clinical and experimental. Rapid progress is being made in the collection of such data, however, which will contribute to the solution of this problem.

FREQUENCY RATES OF FACIAL INJURIES

The importance of facial injuries may be noted from the fact that the frequency rates of incidence of the various bodily areas involved in a series of 661 automobile casualty survivors were as follows: extremities, 28 per cent; head, 20 per cent; face, 19 per cent; chest, 14 per cent; trunk, 7 per cent; neck, 5 per cent; pelvis, 4 per cent; abdomen, 3 per cent. This series was consecutive and represents persons injured severely enough to have been admitted to and treated in the Missouri Methodist Hospital from late in 1949 through 1954.

The significant frequency rate of facial injuries among automobile casualties, as distinguished from all other traffic injuries, has not been determined previously because of their usual inclusion with head injuries in general. In this series of 661 casualties, however, 295 persons, or 45 per cent, received varying degrees of facial injuries as distinguished from injuries of the head.

For statistical purposes, which will become apparent later on, lesions of the forehead have been included herein, thus making frequency of facial injuries second only to injuries of the extremities.

All age groups were represented, but the majority of the patients were young adults. A distribution, according to the place they were seated in the car, of automobile casualty survivors who had sustained facial injuries shows that of 163 men and 132 women involved, 100 men and 21 women were in the driver's seat; 35 men and 65 women were front seat passengers; 10 men and 17 women were rear seat passengers. The seating position was unknown for 22 men and 19 women.

From these figures it can be seen that men predominate in the driver group. The reverse is true of guest passenger

seating. Fifty-one persons in this series could not be classified accurately because of insufficient evidence in the medical records. All that was known was that they were occupants of crash vehicles. Be that as it may, the idea regarding the "death seat" (right front passenger) has not been substantiated by recent observations made in the Cornell Automotive Crash Injury Research or by my own observations, as both sides of the front seat present large injury potentials. The back seat is still considered to be the safest seat in the car, however, (about three times more so than any other area, according to the Cornell investigators).

TYPE OF FACIAL INJURIES

More reliable medical clues regarding the nature and magnitude of forces involved in motorist injuries may be derived, perhaps, from the nature and degree of injury received. In crash-impact studies, even the slightest type of injury may hold some engineering significance, either implicating or absolving certain design features as sources of injury under crash conditions. On the whole, however, injuries of motorists fall into three general classes: topical (lacerations, abrasions and contusions); skeletal (bone and joint), and internal.

The type of lesions received by 295 automobile casualty survivors who had facial injuries were as follows: lacerative, 54 per cent (203); contusive and abrasive, 24 per cent (91); fracture, 22 per cent (80). A number of these people had injuries of all kinds.

It has been stated that the tolerance of human tissues (elastic limits) to high decelerative forces depends not only on the magnitude of the forces acting on occupants of a car, but also on the direction of the forces, their duration and rate of application, and the area of the body over which the forces are distributed. The facial area appears to be unique in several respects. In the first place, facial contours present relatively small pressure areas to impacts. Secondly, except for the mandible, all underlying skeletal structures are unyielding; therefore, the soft tissues overlying the upper two thirds of the facial area must absorb the brunt of all impact energies, whether impulsive or crushing in character, which explains, or at least helps to explain, the frequency of soft tissue injuries in these areas.

The relative mobility of the mandible permits it to act as a buffer against these forces, at least as far as the lower third of the face is concerned. Much depends, of course, on the direction of the forces. Thus, the lacerative qualities of the windshield, dashboard, and steering controls as well as all other knobs and protuberances of the interior design are implicated in the injuries of the facial regions above all other parts of the body (Fig. 1). In other words, the smaller the pressure area—anatomic, mechanical or both—the more lacerative the result, and vice versa with regard to contusion or fracture.

By the same token, these peculiarities of the facial structures and contours undoubtedly play an important part in reducing more lethal types of skull fractures, particularly in instances of forward collisions. How else can the fact be explained that skull fractures, in the series being discussed, were less than one third as frequent as those of the face? The low incidence of skull fractures (at least among survivors) is rather odd in view of the fact that linear fractures of the skull have been produced experimentally by dynamic input energies of 25 to 50 inch pounds for dry skulls and between 400 and 600 inch pounds for cadaver skulls. This fact would seem to emphasize the importance of further observations in this field. It becomes increasingly difficult to reproduce or reconcile the clinical and field situations with the laboratory findings along crash-impact and human engineering lines. But answers will be found.

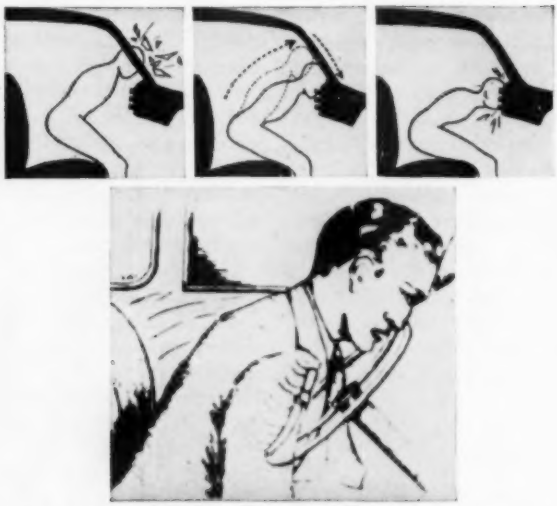

Fig. 1 • Above: Guest passenger injuries; showing mechanism of head and facial injuries: lacerative, impulsive and crushing (from Straith). Below: Mechanism of injury to sternum and propensity for middle third of face to strike steering wheel (sometimes chin on steering post). (From Stuck)

The frequency rates of involvement of the three principal levels of the face were as follows: upper third, 33 per cent (109); middle third, 53 per cent (175); lower third, 14 per cent (49). The large number of lacerative and contusive lesions about the eyes is to be remarked. Several of the latter were severe. The conjunctival tissues were involved frequently, the corneal, rarely; however, injuries to the corneal tissues were sometimes associated with depressed fractures of the malar bones. A frequent complication of the latter fracture was injury to the infraorbital nerve with resultant anesthesia over its distribution.

Lacerations of the lips were noted in 27 persons. Exclusive of complicating tooth injuries, intraoral lacerations occurred in 12 persons, the uvula and tongue were each cut once respectively. The preponderance of injuries to the middle third of the face is to be noted; these included external and internal nasal injuries in 17 persons.

The vulnerability of the middle third of the face to skeletal injuries is shown by the following figures. In 118 fractures, the upper third was involved in seven instances (frontal bones); the middle third in 62 (nasal bones, 26; zygoma, 22, and maxilla, 14); and the lower third (mandible) in 30. In 19 persons, teeth were involved. Several of these fractures were bilateral, usually those involving the mandible. There were three nasal, one maxillary and two mandibular compound fractures. Undoubtedly, there were more of these in the mandible. Teeth were driven into the maxillary sinus in only one instance; more teeth, however, were otherwise injured or lost subsequently.

The facial fractures were associated with lesions in other parts of the body as follows: extremities, 19; chest, 13; skull, 3; spine, 2; pelvis, 2. Eleven of these peo-

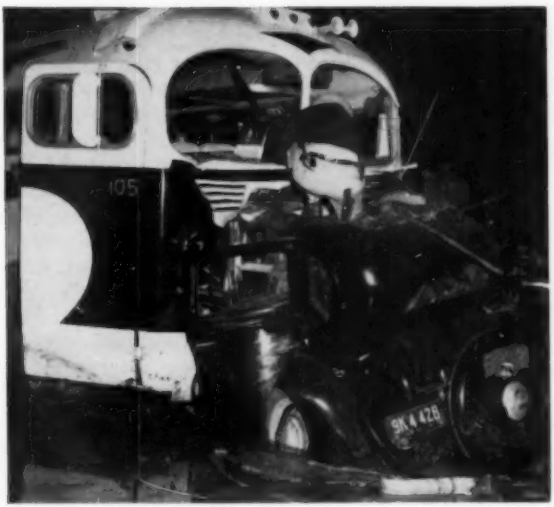

Fig. 2 • Extensive penetration of occupant compartment precludes all possibilities of survival. Crash-impact design hopes only to mitigate survivable crashes

ple exhibited varying degrees of shock on admission to the hospital, and another 18 persons showed signs of cerebral concussion. Only two of them had internal injuries—one had chest injuries and one, head injuries.

COMMENT

The epidemiological approach to the problem of motorist safety (of which human and crash-impact engineering is a component part) is based on the idea that source of impact as well as magnitude is a most important factor in the causation of crash injuries. The first clinical clues, in this regard, are derived from observations by Straith,[1] Stuck[2] and Woodward.[3] On the engineering side, the pioneering efforts of DeHaven deserve special mention. At the present time, research is being carried out along these lines at the University of California (Mathewson and Severy); Harvard (McFarland); Motor Vehicle Research, Boston, (White); Wayne University (Gurdjian, Lissner and co-workers); Cornell Automotive Crash Injury Research (Moore, director); Indiana state police (Sergeant Paul); and last, but not least, by the automotive industry.

The following data stress the importance of the occupant's relation to impact areas as a determinative factor in the production and frequency of skeletal involvement. The occurrence of fractures distributed according to the seating position of those injured is as follows: of 121 in the driver's seat, 37 (31 per cent) sustained fractures; of 96 front seat passengers, 18 (19 per cent);

1. Straith, C. L. Automobile injuries. J.A.M.A. 109:940 Sept. 18, 1937.

2. Stuck, W. G. Fractures of the sternum and thyroid cartilage. Am. J. Surg. 38:560 Dec. 1937.

3. Woodward, Fletcher D. Medical criticism of modern automotive engineering. J.A.M.A. 138:627 Oct. 30, 1948.

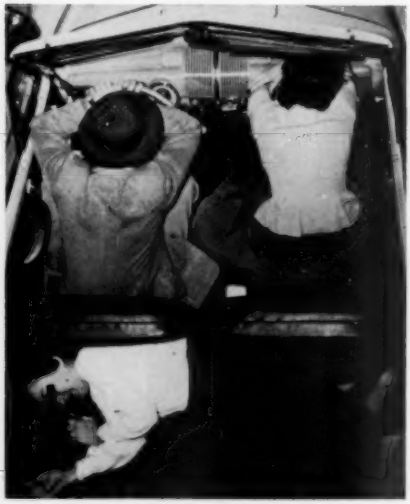

Fig. 3 • Showing how bodily contact with structure, before peak deceleration has occurred, can mitigate forces on occupants, especially (in front) when enhanced by safety belts (from Mechanix Illustrated, DeHaven)

and of 27 rear seat passengers, 9 (33 per cent). Of 51 whose seating position was unknown, 16 (31 per cent) sustained fractures. The average or baseline percentage rate of fractures in this series is 27 per cent. It is to be remarked that all categories of occupancy adhere fairly closely to this figure. However, in larger series, with epidemiologic significance, the back seat always proves to be the safest one in the car. This was especially evident in a study made by the Cornell group in regard to facial injuries in children. The incidence, here, was low because most of these children had been riding in the back seat.

Undoubtedly, fractures sustained by persons seated in the back are caused, in some instances, by the catapulting over the rear of the front seats onto the forward structures of the interior in severe forward crashes or in upsets. I have observed that this occurs especially with children. Dye,[4] of the Cornell Aeronautical Laboratory, Buffalo, has indicated it in his famed experiments with the "thin man" and "half pint." As would be expected, drivers are especially apt to receive facial injuries from impact with the steering controls. Right front seat passengers are also similarly vulnerable to head injuries.

Thus far only a human common denominator has been discussed. On the mechanical side, the common denominator is force. The universality of force is being recognized both in nature and in physics. Its relation to motorist injuries is not easy to define. Force is unleashed during the ungoverned dissipation of kinetic energy which results from rapid deceleration under crash conditions. This energy, originating in the external automotive environment, is then transmitted to occupants via structural components of the vehicle which is undergoing all kinds of deformations and ultimate collapse in some areas, during which phases, it is stated, energy is being absorbed (Fig. 2). This absorption of energy can be beneficial for occupants if they have made structural contacts before decelerative peaking has occurred (roll-with-the-punch-effect) (Fig. 3). This does not operate for those forcibly ejected onto the road, naturally. Forcible ejection through doors or windshield produces an absolutely unpredictable pattern of traumatic events. Forces operative in the internal automotive environment are fantastically high because of the short decelerative distances involved for the anatomic elements (from impact to stop; in the order of hundreds of g's for milliseconds).

Hearsay evidence obtained from medical records was analyzed to find the relation between type of accident impact and nature of injuries received. In 36

4. Dye, E. R. Kinematic behavior of the human body under crash conditions. Buffalo, N. Y., Cornell Aeronautical Laboratory, 1950.

crashes involving collisions with other vehicles other than head-on collisions, there were 12 skeletal and 24 soft tissue injuries; in 23 head-on collisions, there were 6 skeletal and 17 soft tissue injuries; in 14 instances of forcible ejection from the vehicle (from various decelerations), there were 13 soft tissue and 1 skeletal injuries; in 11 collisions with fixed objects other than vehicles, there were 9 soft tissue and 2 skeletal injuries; in 10 instances in which the car rolled over, there were 7 soft tissue and 3 skeletal injuries; in 9 instances of impact from the side, there were 6 soft tissue and 3 skeletal injuries; in 8 instances where the car went off the road, there were 7 soft tissue and 1 skeletal injuries; in 2 instances of blowout (with loss of control), there were 2 skeletal injuries; and in four miscellaneous types of crash impact, there were four soft tissue injuries. The average or baseline percentage rates of soft tissue and skeletal injuries are 74 and 26 per cent respectively. With the exception of the instances of forcible ejection, this relationship obtains throughout the variously established kinds of impacts, which tends to reaffirm the universality of force under all kinds of decelerative conditions and upsets, at least from the standpoint of trends as seen today.

Up to recent times, those treating the injured have been almost wholly concerned with the diagnosis and treatment of mechanical injuries, and have lumped them together, regardless of the source. From studies of cause, it is but a step to prophylaxis. There is much written of deformation characteristics of both external and internal automotive structures, and of surface paddings and safety gear—that is, apparel (crash helmets), and safety belts and shoulder harness (to act as a barrier between occupants and impact areas). These, however, are engineering problems.

From the standpoint of the physician and dentist, it would seem that the attention of the engineer has been focused on the prevention of injuries to the head when facial structures should be getting more attention.

Until more data are known, however, professional groups should avoid arriving at foregone conclusions. The professional responsibility still remains the active and specific treatment of any and all kinds of injuries of motorists. Most important, of course, is first aid, emergency care, and the ultimate definitive treatment.

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The Value of Abstracts • There are three ways of acquiring the medical articles we want to read: by subscribing to the journals that publish them, by visiting medical libraries, or by writing to the authors for reprints. First, however, we should find out *what* is being published, so that we may select what to include in our daily curriculum of reading. The answer to this problem are the journals of medical abstracts, which if well done enable us to pick out quickly the best grain from the fertile crop of recent findings. ***Félix Martí-Ibáñez, Books in the Physician's Life.***

Planning a dental prepayment program for children in an area of low caries prevalence

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The reduction in the intensity of caries attack in areas with fluoridated water has important implications for both private and public health dental practice. Although it is difficult to assess the impact of the lowered caries incidence on the lifetime treatment needs of an individual, it is apparent that the treatment needs of residents in areas with and without fluoridated water differ considerably. Certainly, a reduction of 60 to 70 per cent in the incidence of caries in children brings about a concomitant reduction in the amount of operative dental services needed for this segment of the population. For the dentist in private practice, this reduced attack rate offers the opportunity to provide complete care more readily and to enjoy a more satisfying type of practice. For the public health dentist this reduction requires a re-evaluation of the present ideas of community oral health activities and offers the opportunity to develop programs which will capitalize on the lowered treatment requirements to attain complete maintenance care for a majority of children in a community.

The growing interest in voluntary prepayment health insurance coverage in recent years is a development which may have even greater impact on the practice of dentistry. Recent events have focused particular attention on the need for community-wide prepayment plans for dental treatment of children in the offices of private practitioners. An important consideration in the organization of such a program, as in any dental program, is the caries attack rate in the area of operation. This paper is an attempt to explore the effect of a reduced caries incidence (due to the presence of fluorides) on the organization of a dental prepayment program for children, and to suggest the type of program that might be organized successfully in an area with fluoridated water.

PRESENTATION OF DATA

In 1951, detailed dental examinations were made of 850 continuous-resident school children in the first seven grades in Nampa and Coeur d'Alene, Idaho.[1] The domestic water supply of Coeur d'Alene was fluoride-free at that time, whereas the Nampa supply contained 1.5 ppm of fluorides. The records of the Idaho State Health Department indicate

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†Dental director and chief, Division of Dental Resources, U.S. Public Health Service.

1. Pelton, W. J., and Elsasser, W. A. Studies of dentofacial morphology. III. The role of dental caries in the etiology of malocclusion. J.A.D.A. 46:648 June 1953.

that the fluoride content of these water supplies had remained essentially unchanged since at least 1937. (From January 1952 until May 1955 the Coeur d'Alene water supply was supplemented with fluorides to carry about 1 ppm of fluoride.)

In 1951, the caries experience of the children was recorded by surface. This method permits a variety of analyses, including the conventional method of summarizing the prevalence of caries by the number of DMF (decayed, missing, and filled) permanent teeth.[2] As might be expected, children living in Nampa showed a consistently lower DMF rate than did children in Coeur d'Alene. Nampa children averaged only 0.35 DMF teeth at seven years and slightly less than two DMF teeth at age 13. Coeur d'Alene children, however, averaged almost two DMF teeth at age seven and almost 10 DMF teeth at age 13.

The DMF rate, although adequate as a method of measuring caries incidence or prevalence, is difficult to use in estimating actual treatment needs or costs of treatment. For the purposes of this paper, therefore, the examination findings were translated into the dental treatment that had been previously received and the current treatment needed, in terms of specific operative procedures. For example, a posterior tooth with a mesial cavity was recorded as a tooth requiring a two-surface (mesioocclusal) restoration. Similarly, other teeth with carious lesions were recorded as requiring one-surface, two-surface or three-surface restorations, or extraction. The restorations present in the mouth and the missing teeth (which presumably had been extracted) were considered to be rough measures of the relative magnitude of the restorative and surgical treatment received by the children prior to examination. This analysis is given in Table 1.

The cost of dental treatment needed to correct defects present at the time of examination can be estimated from this type of analysis by the application of a given fee schedule. It is also possible to summarize the cost of restorative work and extractions previously received insofar as evidence of the work still persists in the mouth. For this purpose a fee schedule was drawn up which was comparable to the fees charged by the dentists in the study communities. A fee schedule questionnaire had been filled out by most of the dentists practicing in the two communities in 1954. The results were averaged and rounded to the nearest dollar. It should be recognized that the estimates of cost used in this paper are based on economic conditions prevailing in the study cities during 1954 and 1955.

The use of the fee schedule made possible the computation of index figures for the cost of dental treatment which may be compared for fluoride and fluoride-deficient communities (Table 2). In the computation no account was taken of the diagnostic services required, on the assumption that the extent and frequency of such services would be determined administratively in such a manner that the cost could be added to the final plan for care.

As might be expected, the cost of providing complete dental health care needed at the time of examination differs considerably in the two cities. Operative care and extractions for the primary teeth of Nampa children would have cost less than half what similar care would have cost for Coeur d'Alene children. At the age of eight, for example, the average child living in Nampa had already received dental health care for the deciduous teeth that cost about $5.27. An additional $7.12 worth of dental care was needed, making an estimated cost of $12.39 for past and currently needed treatment of the deciduous teeth. The

2. Klein, H., and Palmer, C. E. Studies on dental caries. X. Procedure for the recording and statistical processing of dental examination findings. J. D. Res. 19:243 June 1940.

average child of the same age living in Coeur d'Alene, however, had already received $13.00 worth of care but needed additional care amounting to $17.66.

The same differential exists in the cost of providing care for the permanent dentition. It would have cost about $10.50 to provide complete care for the permanent teeth of the average 13-year-old child living in Nampa. The average Coeur d'Alene child of the same age had already received more than $41.00 worth of treatment, yet needed additional dental health care that would cost about $24.00, or a total expenditure of $65.54 for past and currently needed treatment of the permanent dentition.

The low average cost of providing dental treatment to Nampa children reflects both a reduced incidence of caries in in-

Table 1 • Average treatment received and additional treatment needed at the time of examination for continuous-resident children in Nampa and Coeur d'Alene, Idaho

Age	No. of children	Posterior fillings						Anterior fillings		Extractions	
		1 surface		2 surface		3 surface					
		Perm.	Decid.	Perm.	Decid.	Perm.	Decid.	Perm.	Decid.	Perm.	Decid.
Treatment received—Nampa											
6	113	.03	0.65		0.34						0.10
7	77	0.17	0.48		0.27						0.13
8	83	0.24	0.53	.01	0.53		.05		.05		0.23
9	65	0.63	0.58	.02	0.48		.03		.03	.03	0.48
10	36	0.42	0.53	.06	0.25		.03			.03	0.72
11	49	0.55	0.24	.04	0.14			.02		.06	0.33
12	47	1.11	0.11	.02	0.11			.04		.02	0.43
13	36	1.64	.03	.06				.06			.08
Treatment needed—Nampa											
6	113	0.12	0.49		0.67				0.29		.05
7	77	0.26	0.40		1.01		.01		0.14		0.10
8	83	0.54	0.43		1.02		.05	.02	0.22		0.12
9	65	0.38	0.32		0.68		.03		.09		0.15
10	36	0.89	0.33	.06	0.67				0.11	0.11	.03
11	49	0.45	0.10	.02	0.20		.02	.02	.02		.04
12	47	0.45	0.11		0.13			.02		.02	.09
13	36	0.75	.06	.03	.03				.03		
Treatment received—Coeur d'Alene											
6	58	.03	0.84		0.90		.02		.02		0.41
7	58	0.53	0.50	.02	1.26		0.17	.02	0.14	.03	0.45
8	64	1.75	0.42	0.17	1.55		.08	.03	.06	.03	1.16
9	41	2.39	0.34	0.24	0.66	.02		.05	.02	0.15	1.56
10	42	2.69	0.43	0.26	0.45	.02	.05	0.31	.05	0.17	1.10
11	34	2.71	0.32	0.79	0.41	.06	.09	0.85		0.38	0.44
12	21	3.48		0.81				0.14		0.43	0.67
13	24	4.42		1.50		0.42		1.08		0.62	
Treatment needed—Coeur d'Alene											
6	58	0.74	1.07		2.00		0.47		1.91		0.21
7	58	1.67	0.81		2.52		0.33		0.97	.03	0.28
8	64	2.38	0.91	.06	2.16		0.50	.09	0.98	0.11	0.22
9	41	2.41	0.54	0.24	2.37		0.54	0.15	0.98	0.17	0.37
10	42	2.24	0.36	0.36	1.31	.05	0.26	0.83	0.38	0.21	0.17
11	34	2.56	0.47	0.29	0.41		0.21	0.71	0.26	0.18	0.12
12	21	3.43		0.43	0.14			0.86	0.10	.05	0.10
13	24	3.08		0.88				0.79	.04	0.25	

Table 2 • Average cost (in dollars) of dental treatment received and additional treatment needed by continuous-resident children in Nampa and Coeur d'Alene, Idaho

Age	Treatment for permanent teeth			Treatment for deciduous posterior teeth*			Cost of total care
	Received	Needed	Total	Received	Needed	Total	
			Nampa				
6	0.11	0.46	0.57	3.94	4.98	8.92	9.49
7	0.68	1.04	1.72	3.19	6.68	9.87	11.59
8	1.05	2.31	3.36	5.27	7.12	12.39	15.75
9	2.75	1.54	4.29	5.78	5.03	10.81	15.10
10	2.17	4.39	6.56	5.19	4.42	9.61	16.17
11	2.86	2.06	4.92	2.43	1.59	4.02	8.94
12	4.91	2.00	6.91	2.13	1.21	3.34	10.25
13	7.28	3.19	10.47	0.33	0.31	0.64	11.11
			Coeur d'Alene				
6	0.14	2.97	3.11	8.38	17.09	25.47	28.58
7	2.50	6.83	9.33	10.34	18.14	28.48	37.81
8	8.52	10.94	19.46	13.02	17.66	30.68	50.14
9	12.39	12.93	25.32	9.00	18.29	27.29	52.61
10	15.36	17.79	33.15	7.17	9.95	17.12	50.27
11	23.62	17.24	40.86	4.97	5.26	10.23	51.09
12	22.14	22.05	44.19	2.00	1.00	3.00	47.19
13	41.33	24.21	65.54	—	—	—	65.54

*Includes all deciduous teeth extracted or indicated for extraction.

dividual children and a smaller proportion of persons attacked. About half of the children examined in Nampa had unmet treatment needs, whereas from 72 to 95 per cent of the Coeur d'Alene children needed some dental treatment at the time of the examination.

PROPOSED PREPAYMENT PLAN

The data presented here are typical of those which are available or can be obtained in any community. Such data can be used to outline a community prepayment plan for children and to assess the effect of caries attack on premium rates and policies.

In organizing such a program it would be logical to utilize the school system and integrate the plan with its routine dental health educational activities. Dental health care would be provided in the offices of the local dentists, who would be reimbursed on a fee-for-service basis. The plan would be a voluntary, nonprofit enterprise incorporated under the insurance laws and practice acts of the state where it is located.

It would seem wise to initiate this program in a community of moderate size (15,000 to 30,000 population) with enough facilities for successful operation, yet small enough to possess a unified community spirit. Other community characteristics such as a progressive school system, active volunteer agencies and a well-organized local health department would also affect the success of a prepayment program.

The single most important group would be the dentists who practice in the community. There should be enough dentists to insure that necessary treatment can be provided without straining the local resources, and they must be sincerely interested in the success of the plan. In addition, it would be important that they be well qualified and skilled in handling children. Certainly, it would be hoped that the primary leadership in organizing the prepayment program would come from the dentists, but it must not appear

that the plan has been developed solely for their financial gain.

Educational activities are an important component of a complete community-wide dental program. Dental hygienists or dental health educators should be available as consultants and resource persons in the educational system to help formulate an aggressive educational campaign designed to convince parents and children of the necessity of regular dental health care and the advantages of obtaining it on a prepaid basis.

In order to provide treatment for a large segment of the child population with a minimum interference from economic factors, the program would be organized to assure the enrollment of the largest possible proportion of the school children. Furthermore, the plan could be enhanced by arrangements with community agencies, perhaps local civic groups or public welfare organizations, to pay for the premiums covering the care of indigent children.

Administration • The over-all administration of the dental prepayment plan should rest with a governing board composed of representatives of the dental profession, the school system and the public. (The corporate organization of the program would involve legal questions, and would be determined largely by the requirements of state law in the area of operation.) The governing board would determine over-all policies for both the health education and the prepayment phases of the program. The professional standards of the prepayment plan would be determined by an advisory board of dentists. The health education program would be carried out by a dental hygienist or dental health educator employed by one of the sponsoring organizations (probably either the school or the health department) at no cost to the plan.

Enrollment • The fear of unforeseen and catastrophic expense, which appears to be an important factor in motivating the purchase of hospital and medical care insurance, can hardly be expected to induce the public to buy dental services for children on a prepaid basis. Dental disease requires a recurring expenditure, and seldom, if ever, reaches catastrophic proportions. The size of the premium rates necessary to support a prepayment dental program for children appears to have an especially important bearing on the success of the plan. If the rates are low enough, the convenience of being able to pay for dental care on a budget basis should have considerable appeal. If not, parents may well be inclined to meet the costs as they arise, thus dooming the plan and probably limiting the care received by many children to emergency service.

It would be advantageous to establish the program with a broad base of community participation so that civic spirit could be used as a motivating influence. If, for example, the Parent-Teachers' Association would accept the prepayment program as a project, a large proportion of the children in the community probably could be enrolled. This sponsorship would provide a large group of volunteer workers and would bring to bear group pressures to influence participation in the plan. Unless a sizable number of the children in the community are included in the plan, there is a danger that an adverse selection of risks might result in the enrollment of a preponderance of caries-susceptible children. This can be guarded against by specifying that unless a certain proportion of the children enroll, the program will not go into operation.

It probably would be wise to conduct one city-wide enrollment campaign each year. Membership in the plan would then be on an annual basis, and the administration somewhat simplified. Three methods of paying for the yearly premium might be offered: (1) payment in full at the time of enrollment; (2) payment of half the premium at the time of enrollment and the balance some months later,

or (3) being billed through the central office for the monthly payments. An additional charge could be made for the monthly and semiannual payments which would encourage lump-sum payment and would help defray the additional expense of frequent collections.

The monthly plan would present some problems in terms of maintaining payments after dental care had been provided. This would be alleviated partially by proper writing of the enrollment contract, and perhaps by requiring membership for several months before treatment would be given. An initial enrollment fee, to assure reserves to meet the high cost of initial care, would provide further safeguards.

Diagnostic Services • The policies governing the provision of prophylaxis and diagnostic services will play an important part in determining the size of the premium necessary to support a prepayment plan. One of the prime objectives of a community dental health insurance plan would be to assure that all children receive at least the minimum diagnostic services considered essential for complete oral health care. The cost of providing these services, however, must be carefully appraised, particularly in an area of low caries prevalence, because diagnostic services will comprise a large portion of the total cost of providing care. Experience has shown that even where caries rates are moderately high, a program which decreases the interval of time between recalls for routine maintenance care produces an increasingly higher proportion of cost expended for diagnostic services.[3]

It is to be expected that the needs of individual children will vary widely, and that a policy of frequent recalls would need to apply to only that portion of the group highly susceptible to dental disease. One method of avoiding the difficulty of setting arbitrary standards for recall examinations and at the same time controlling the cost of diagnostic services would be to set a standard yearly fee for these services and let the individual dentist determine how frequently they should be provided in each instance.

Premium Rates in a Fluoride Area—Initial Year • The reduction in the intensity of the caries attack rate due to the presence of fluorides in the drinking water should lower the cost of prepayment dental care in at least two ways—by reducing the amount of operative care necessary and by lowering the diagnostic costs. It appears possible that the desired health goals could be obtained in a city such as Nampa by providing less than two complete oral examinations a year for most of the children. It is suggested, therefore, that a yearly fee of $6.00 be set to cover examination, prophylaxis and roentgenograms. The fee would be authorized only once a year, but the dentist would be expected to examine the child as many times during the year as he believed necessary.

The analysis of the dental examinations of the continuous-resident Nampa children indicated that the children in the first six grades had average unmet treatment needs of $7.41. Although the examinations were limited to continuous-resident children, it is believed that in Nampa, a stable community surrounded by an area where almost all water supplies contain considerable amounts of fluorides, the inclusion of noncontinuous residents would not raise this average appreciably. An allowance of $8.00 would appear to be an adequate estimate for the per capita cost of providing operative treatment in Nampa during the first year.

It is estimated that the administrative cost for employing a bookkeeper and for supplies and miscellaneous expenses

3. Pelton, W. J., and Pennell, E. H. Predictability of dental care needs of adults. J.A.D.A. 52:703 June 1956.

Table 3 • Per capita cost (in dollars) and method of financing proposed program

City and year	Per capita cost of program operation				Cost to patient		
	Diagnosis and prophylaxis	Treatment	Administration	Total	Enrollment fee	Annual premium	Total
Nampa							
Initial year	6.00	8.00	3.50	17.50	3.00	15.00	18.00
Maintenance years	6.00	5.50	3.50	15.00	—	15.00	15.00
Coeur d'Alene							
Initial year	20.00*	29.00	3.50	52.50	15.00	37.50	52.50
Maintenance years	14.00*	20.00	3.50	37.50	—	37.50	37.50

*Includes topical fluoride applications.

would come to about $4,500.00. (The salary of the dental hygienist or health educator would be paid by one of the sponsoring organizations, at least during the first years of operation.) If 60 per cent of the children in the first six grades were enrolled in the plan, the total membership in Nampa would be approximately 1,300, making the per capita administrative costs approximately $3.50. The total cost of operating a prepayment program (operative treatment, diagnostic services and administrative costs) during the first year, therefore, may be estimated to be $17.50 per child (Table 3).

Premium Rates in a Fluoride Area—Maintenance Years • During subsequent years some reduction in cost may be expected. In fact, the experience of the Group Health Association, Inc., would indicate that treatment costs might be reduced as much as one third.[4] A reasonable estimate of the per capita costs of providing operative and surgical treatment after the first year of operation would appear to be $5.50. Even if the administrative and diagnostic costs remained static, this would bring the average annual cost per child down to about $15.00. It is probable, however, that the administrative costs also could be reduced as the program developed by extending the coverage to include additional grades and by retaining as many of the original enrollees as possible, as long as they remained in school.

The premium estimates appear to be high enough to assure the solvency of the program. In addition to the allowance for unforeseen expenses, it should be remembered that the analysis of the original examination included all carious lesions seen in the mouth. Some of the lesions recorded, particularly in the deciduous teeth, would not be treated in actual practice. Nevertheless, additional safeguards probably are necessary against unforeseen operating difficulties. This problem has ordinarily been met in organizing volunteer health insurance by having the providers of service (in this case the dentists) act as co-insurers. In other words, the participating dentists would agree to accept less than full fee payments if receipts were not sufficient to meet all obligations. It is this principle which has made it possible to organize voluntary hospital and medical care insurance without obtaining large initial reserve funds.

It might be advisable to assess an initial enrollment fee of $3.00 when the child first enrolls in the program. The

4. Comprehensive dental care in a group practice. Public Health Service Publication No. 35. Washington, D. C., U.S. Government Printing Office, 1954, p. 22.

enrollment fee, together with a yearly premium of $15.00 would provide sufficient funds to operate the program during the first year when the accumulated need for treatment would be most evident. In subsequent years children who had been enrolled previously would pay only the annual premium of $15.00, whereas new enrollees would also pay the initial registration fee, thus compensating for the backlog of needs that they would probably bring into the program.

Premium Rates in a Fluoride-Deficient Area—Initial Year • The high caries attack rate of children in a community with a fluoride-deficient water supply makes frequent clinical and roentgenographic examinations mandatory. In a community such as Coeur d'Alene, it is probable that a sizable portion of the children would require two or more oral examinations a year if the desired health goals are to be attained. At the same time, provisions should be made to provide topical fluoride treatments for most of the children enrolled in the program. The minimum allowance that could be made for diagnostic services, prophylaxis and topical fluoride treatment during the initial year would be $20.00.

The children in the first six grades who were examined in Couer d'Alene had unmet dental treatment needs that would have required almost $29.00 to correct. If an allowance of $3.50 is made to cover the administrative costs, as in Nampa, it would cost about $52.50 per child to finance the first year's operation of a prepaid dental care program in a community like Coeur d'Alene.

Premium Rates in a Fluoride-Deficient Area—Maintenance Years • In subsequent years only a third of the children would need topical fluoride treatment, and the per capita allowance for diagnosis, prophylaxis and topical fluoride treatments could be lowered to $14.00. If it is assumed that the administrative costs remained the same, and that the cost of providing operative care could be cut by one third when the children were put on a maintenance basis, the yearly per capita cost would be less than $37.50. In order to finance a prepayment program in a fluoride-deficient community, therefore, it would be necessary to assess an enrollment fee of $15.00 and a yearly premium of at least $37.50. As the program became effective, coverage could be extended as previously described for the maintenance years in a fluoride area.

DISCUSSION

The potentialities of a community-wide prepayment program for children appear particularly attractive. Traditionally, in view of the large backlog of dental services needed by the population, the dental profession has looked toward the younger generation with the hope that successful health education activities would make it possible to rear a generation with healthy mouths and an active interest in oral health. Many school systems at present already have excellent educational and treatment programs. The addition of dental prepayment would seem to offer unique possibilities for a complete oral health program.

From an administrative standpoint a prepayment dental program for children has certain obvious advantages. One of the peculiar problems encountered in applying prepayment to dental treatment needs is the chronic and accruing nature of dental disease. In children, this problem is minimal because, even if the enrollments do not start until school age, the children come into the program before they have accrued a large backlog of treatment needs. Furthermore, since children in school are easily accessible for examination it is a relatively simple matter to determine at the outset of the program the case load that may be expected. In an adult program, predetermination of needs and an assessment of the case

load are generally extremely difficult or impossible.

It seems probable, moreover, that the problem of obtaining adequate enrollment would be less difficult with children than with adults because parents frequently are willing to do for their children what they are not willing to do for themselves. In addition, the school situation provides opportunities to utilize group pressures through the schools and allied volunteer agencies.

The reduction in premiums made possible by the lower caries attack rate in a community with fluoridated water would have obvious advantages in organizing a dental prepayment program. The rapid growth of hospital and medical care insurance has shown that people are willing to purchase health care on a prepayment basis if they are able to obtain benefits that they desire at a price which they consider reasonable.

The purchase of health insurance, however, is partly motivated by the fear of large and unpredictable future expense. Because of the chronic and recurring nature of dental diseases, the fear of severe and unpredictable financial loss will not be an important factor in motivating membership. The main advantage that dental prepayment would offer would be the opportunity to pay for professional care on a regular, budget basis. In order to make this factor attractive, it would be necessary to have reasonably low premium rates.

It seems probable that, under favorable circumstances, a considerable number of parents would be willing to pay an annual premium of $15.00 a year for dental treatment for their children. Such a premium might be within the reach of most families—even in those families which have more than one child in the age groups covered by the plan. On the other hand, it seems less likely that as many parents could be motivated to purchase prepayment dental health care if the premiums approach $40.00 a year. Even on a maintenance basis, parents with two children in a fluoride-deficient community such as Coeur d'Alene would be required to pay at least $75.00 a year in premiums.

SUMMARY

A community prepayment program to provide dental health care for children seems to offer attractive possibilities for improving oral health conditions and contributing to the satisfactions of dental practice. Experience has shown that the basic problem in voluntary health insurance is to offer services that the people desire at a premium that they are willing to pay. The premium rate is particularly important in dental prepayment because the fear of unpredictable catastrophic expenditures for dental health care is largely absent.

Analysis of data derived from dental examinations in Nampa and Coeur d'Alene, Idaho, indicates that considerable reductions in treatment costs and therefore a corresponding decrease in premium rates may be expected in a community such as Nampa where the drinking water contains an optimum amount of fluorides. A proposal has been outlined for a prepayment program in a fluoride community, and it is estimated that complete operative care for elementary school children could be purchased for as little as $15.00 a year.

Authorship and Science • The story of any science lies as much in the story of the men who wrote important books as in the story of the men who made the great discoveries. ***Harold A. Calahan.***

Root canal obturation

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A recent statistical analysis of instances in which endodontic treatment was completed has shown that in 97.26 per cent of the cases studied, the root canal therapy was successful at the end of a two year period.[1] This high degree of success in root canal therapy is dependent on proper performance of the endodontic triad—canal enlargement, canal sterilization and canal obturation.

Within the past few years, endodontic literature has dealt primarily with intracanal sterilization, almost to the point of ignoring the basic technic of canal preparation and obturation. In contrast, a feeling has developed among some endodontists that canal sterilization should rank below the preparation and filling of the root canal when endodontic treatment is considered from the standpoint of long range success.[2] The importance of canal sterilization during treatment is indisputable, however.

CAUSE OF FAILURE

Extended study of endodontic success and failure reveals the most common cause of endodontic failure to be the incorrectly filled root canal (Fig. 1). Actually, about 75 per cent of the instances in which endodontic treatment was unsuccessful in the study mentioned earlier was related to the failure to seal the root canal space hermetically. The acceptance of any performance short of total canal obturation is not to be tolerated, if a high level of success is to be maintained.

Unfortunately, the usual roentgenographic criteria by which root canal fillings have been judged leaves much to be desired. Generally speaking, if the standard faciolingual projection roentgenogram indicates the root canal is filled to the apex or overfilled, the tooth is judged to be correctly filled. Such is not necessarily true, however.

Recently Dow and Ingle[3] demonstrated that a root canal may appear to be well filled, and yet the hermetic sealing of the canal may be far from complete.[3] After filling the canals of extracted teeth and taking roentgenograms (Fig. 2), Dow placed the teeth in radioactive iodine, I^{131}. In those teeth with hermetically sealed root canals, there was no penetration of the radioactive iodine (Fig. 3, left). In the poorly filled canals—although they appeared well filled by standard x-ray projection—a deep penetration into the canal by the I^{131} became apparent in the radioautographs (Fig. 3, right). This penetration of a radioactive liquid into a poorly filled canal is analogous to leakage through the apical foramen of a poorly filled root canal *in situ*.

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1. Ingle, J. I., and Teel, W. S. Evaluation of student attainment J.D. Educ. 19:26 Jan. 1955.

2. Bender, I. B., and Seltzer, S. Probability of error of the negative culture with the use of combinations of antibiotics in endodontic treatment. Oral Surg., Oral Med. & Oral Path. 7:1311 Dec. 1954.

3. Dow, P. R., and Ingle, J. I. Isotope determination of root canal failure. Oral Surg., Oral Med. & Oral Path. 8:1100 Oct. 1955.

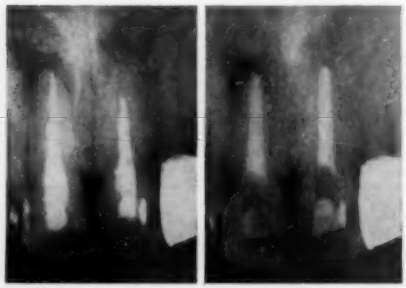

Fig. 1 • Before and after treatment. Previous failure to obturate root canals (left) led to bilateral chronic alveolar abscesses with draining fistulas. Correct endodontic therapy (right) consisting of canal enlargement, sterilization and obturation will restore region to health

Rickert[4] demonstrated the damaging effect of the incompletely filled canal with the "open-closed tube" experiment in which a sterile tube, open at one end, closed at the other, was buried in the tissue of an experimental animal. Around the sealed end of the tube no tissue reaction developed, whereas a severe inflammatory reaction developed at the tube's open end.

Here again, in Rickert's experiment as in Dow's, is an analogy to the pulpless tooth. The absence of tissue reaction around the sealed end of the tube resembles the normal periapical tissue associated with the apex of a normal tooth or the well filled pulpless tooth. On the other hand, the severe inflammation associated with the tube opening resembles the inflammatory reaction (granuloma) found at the apex of either the untreated or poorly filled root canal.

So often the clinician assumes that the radiolucent periapical lesion is an abscess and that it is infected. Actually, this is

4. Rickert, U. G., and Dixon, C. M. Controlling of root canal surgery. Tr. Int. Den. Cong. 3:15 Aug. 1931.

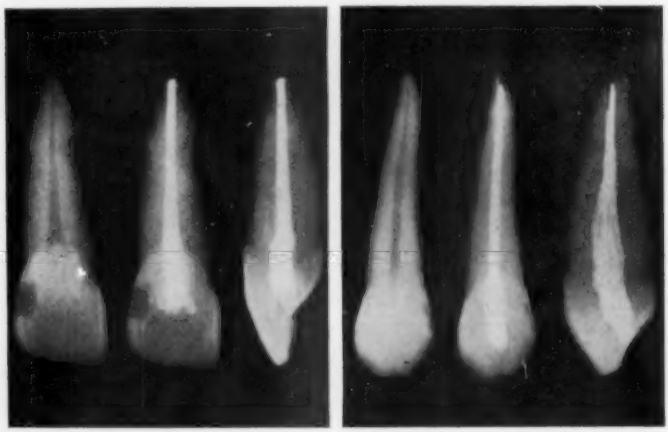

Fig. 2 • Left: Roentgenograms of well filled root canal in extracted central incisor, before therapy (left). Standard faciolingual projection (center) shows well filled canal. Mesiodistal projection (right)—impossible to obtain in the mouth—also shows well filled root canal. Right: Roentgenograms of poorly filled root canal in extracted cuspid, before therapy (left). Standard faciolingual projection (center) shows apparently well filled root canal. Mesiodistal projection (right) shows, however, lack of condensation and failure to seal the foramen hermetically. (Courtesy of Oral Surgery, Oral Medicine and Oral Pathology)

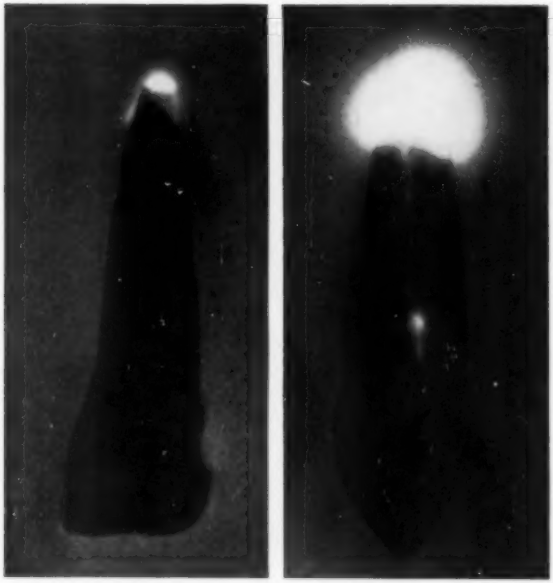

Fig. 3 • Left: Radioautograph of well filled central incisor (see Fig. 2, left) exposed after the tooth was immersed in radioactive iodine, I^{131}. Note that complete obturation of the root canal prevents leakage of the isotope into the root canal space. Right: Radioautograph of a poorly filled cuspid (see Fig. 2, right) exposed after the tooth was immersed in radioactive iodine, I^{131}. Note that the failure to seal the root canal hermetically has led to leakage of the isotope into the root canal space. (Courtesy of Oral Surgery, Oral Medicine and Oral Pathology)

not necessarily the case.[5] Periapical inflammation usually persists, not because it is being irritated by bacteria but because it is being irritated by enzyme breakdown products leaking from the open or partially filled root canal. The toxic leakage, in and out of the poorly filled canal, is a constant irritant whether bacteria are present or not.

The moisture which leaks into the partially filled canal arises indirectly from the blood stream. The liquid content of the blood, the serum, is actually made up of a number of proteins, enzymes and salts in water. Serum constantly infiltrates the poorly filled root canal and there, in a cul-de-sac, undergoes degradation. Later, when the degraded enzymes recirculate to the periapical tissue, they act as a physiochemical irritant and produce the constant inflammation which has been termed a granuloma.

In the light of this explanation, the source of the irritant which flowed from the open end of Rickert's sterile tube can be understood. Also the toxic effect of the breakdown products which are produced in and are released from the poorly filled root canal demonstrated by Dow can be envisioned. These simple experi-

5. Hedman, W. J. Investigation into residual periapical infection after pulp canal therapy. Oral Surg., Oral Med. & Oral Path. 4:1173 Sept. 1951.

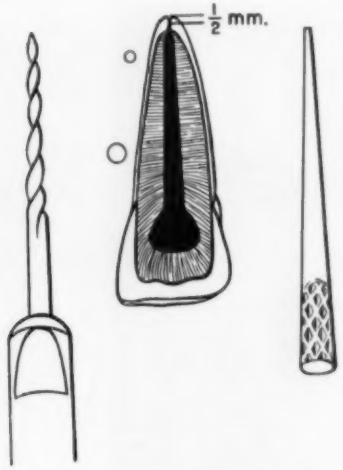

Fig. 4 • Round tapered root canal cavity prepared 0.5 mm. short of the apex to insure a minimal apical opening. Obturation is obtained with a single blunted gutta-percha cone cemented to place. A cone must be chosen which is the same size and shape as the largest instrument used to enlarge the canal

ments of Dow and Rickert—*in vitro* and *in vivo*—point up the importance of canal obturation.

The term "canal obturation" does not necessarily imply that the canal must be filled exactly to the foramen. As a matter of fact, there is good evidence to show that the canal filled just short of the apex is more certain of success than the canal filled exactly to or through the foramen.[6,7]

Obviously, perfect endodontics will depend in large measure on the preparation of a root canal ideally shaped for filling. Seidler[8] has described this ideal canal as "round, tapering and with a minimal apical opening." These criteria assume importance when the shape of present-day root canal filling materials and the

6. Blayney, J. R. Tissue reaction in the apical region to known types of treatment. J. D. Res. 9:22 April 1929.

7. Ingle, J. I. Unpublished data.

8. Seidler, B. Technic and rationale of filling root canals. New York J. D. 24:376 Nov. 1954.

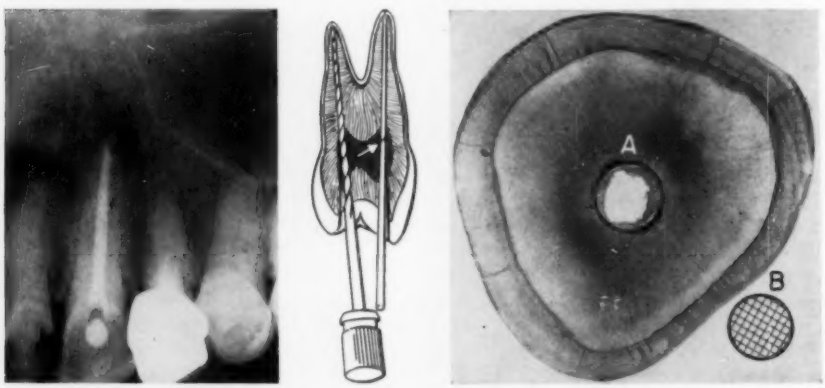

Fig. 5 • Left: Single gutta-percha cone obturation of an upper cuspid in an 82 year old patient. The canal was previously enlarged to the size of a no. 8 reamer. Center: Single silver cone technic for the upper first bicuspid. The lingual canal is being enlarged to within 0.5 mm. of the foramen with a no. 6 reamer. The "trial cone" in the buccal canal is a no. 5 silver cone which exactly fits the "cavity" previously prepared with a no. 6 reamer. After roentgenograms are made, the cone is removed and is almost severed with a carborundum disk at a point 1.0 mm. above the floor of the chamber (see arrow). After the cone is cemented to place, the excess is broken off and removed. Right: A. Canal shape which lends itself to round tapered enlargement. B. Cross section of silver cone to be used in canal obturation. The silver cone is comparable to a preformed inlay in that the cavity is prepared to fit the cone

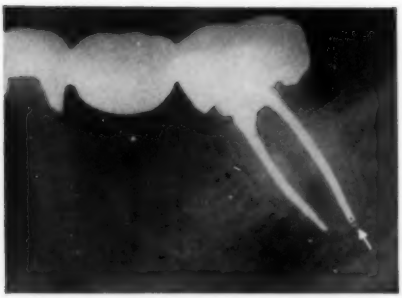

Fig. 6 • Root canal therapy employed to save a pulpless molar abutment. The distal canal is filled with a no. 6 silver cone and the two mesial canals (superimposed) are obturated with no. 5 silver cones. Note presence of root canal cement (arrow) ahead of blunted cone and filling the final 0.5 mm. of canal space

methods employed in filling root canals are considered.

METHODS OF OBTURATION

The two most common root canal filling materials used today are gutta-percha cones and silver cones. Generally, both the gutta-percha and the silver cones are cemented to place with nonabsorbable cements such as cloropercha or zinc oxide-eugenol-silver cements. The absorbable cements, used so extensively in central Europe, have not had general acceptance in North America. Both the gutta-percha cone and the silver cone are round and tapered and, hence, fit best in the round tapered canal.

The two most popular methods of filling root canals employ either (1) a single cone technic, or (2) a multiple cone technic.

The single cone technic is ideal if the root canal cavity can be prepared round and to the correct taper and size to fit almost perfectly the single, preshaped silver or gutta-percha cone. The single gutta-percha cone sometimes may be used to obturate the canal space in maxillary anterior teeth prepared by large reamers, size no. 7 to 9 (Fig. 4). The ideal tooth for this treatment is usually a straight-rooted maxillary central incisor or cuspid in the older patient (Fig. 5, left). Lingual roots of upper molars and distal roots of lower molars may also fall into this category. The pulpless canal must have been so reduced in size by secondary dentin formation that the operator may enlarge the entire canal back to the exact shape of the instruments. A medium or coarse gutta-percha cone is then selected which will fit the prepared canal, not only for its entire length, but laterally as well. If the canal and cone are then liberally coated with cement and the cone is placed to full measured depth, canal obturation will be assured.

The silver cone generally is ideal for filling the prepared "round tapering"

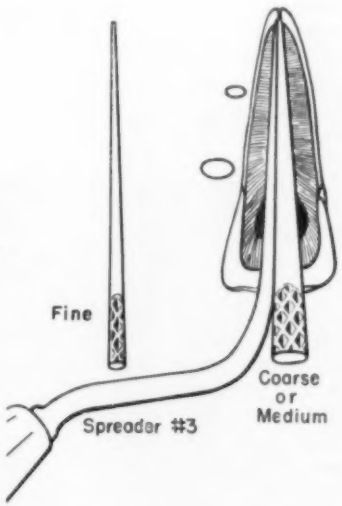

Fig. 7 • The multiple cone technic used to obturate the ovoid canal. The canal cavity is prepared with filings to within 0.5 mm. of apical foramen. The initial cone is a blunted gutta-percha or silver cone cemented to depth and then spread aside to allow additional fine gutta-percha cones to be inserted. The process is continued until further cones cannot be added

canal. These cones are fabricated to the shape and diameter of the endodontic instruments used to enlarge and clean the canal (Fig. 5, center). The silver point should fit the cavity prepared for it much as an inlay fits a cavity preparation in the crown (Fig. 5, right). Canal preparation should always be carried to a point where the instruments—preferably reamers—are excavating clean, white dentin filings.

American made silver cones are oversized. It is therefore necessary to use a cone one size smaller than the number of the last instrument used in the canal.

Below are listed the minimum sizes of reamers to which canals should be enlarged:

Canal	Reamer size (no.)	Silver cone size (no.)
Mandibular		
anteriors	6	5
bicuspids	6-7	5-6
molars		
distal	6-8	5-7
mesial	4-6	3-5
Maxillary		
first bicuspid	4-6	3-5
second bicuspid	6	5
molars		
lingual	6-8	5-7
buccal	4-6	3-5

Curved instruments should always be used in curved canals. Rarely should a curved canal be enlarged above a size no. 4 reamer. The minimum enlargement listed will insure a "round tapering" canal in the important apical third of the root. The operator should still be guided by the "clean, white dentin filings" rule.

After canal preparation, roentgenograms are taken with the selected silver cone in place to make certain that it extends to within 0.5 mm. of the apical limit of the canal preparation. When cemented to place, the blunted end of the cone forces root canal cement ahead of the cone to obturate the remaining space of the canal (Fig. 6). Unfortunately, failures may occur with silver cones primarily if too small a silver cone is used or if the cone is not thoroughly cemented in place.

MULTIPLE CONE TECHNIC

When, because of the size, taper and shape of a canal, the single cone does not satisfy the requirements of canal obturation, the clinician must resort to the multiple cone technic. In this method, an initial cone is cemented in place but is then displaced within the ovoid canal by a sharp tapered instrument called a spreader, so that additional cones may be added to the canal to insure obturation (Fig. 7). This method has the advantage of assuring the operator that the canal is completely filled, but has the disadvantage of encouraging overfilling.

Overfilling emphasizes the importance of the third criterion for the ideal canal for filling, that of the minimal apical opening. Obviously, in the act of filling the canal, the chances of overfilling are greatly increased if the apical foramen is "wide open." In both the single and multiple cone technics, it is very difficult to confine the filling material within the canal if the foramen is more than a "pin point" (Fig. 8, left). This is especially true when the pressure of the spreading method is used. Sommer and Brooks[9] have suggested that a blunted silver cone be used as the initial cone. This cone, which seals the apex, is spread aside and followed by gutta-percha cones. By this method, overfilling is largely prevented.

MINIMAL APICAL OPENING

The necessity for retaining the minimal apical foramen enhances the importance of limiting the instrumental enlargement of the canal short of the foramen. As an arbitrary and ideal figure, a point 0.5 mm. from the foramen has been selected and has proved satisfactory (Fig. 5, center).

9. Sommer, R. S., and Brooks, G. R. Personal communication, Nov. 1954.

The question is frequently asked as to why success can be expected if 0.5 mm. of the canal is not filled. The answer is simple; success is based on any one of three factors. First, an area of this minute, almost microscopic size, can serve as no great reservoir of irritating necrotic debris nor as a bacterial haven, as did the unfilled or poorly filled root canal. Second, the small open area at the apex may fill in with vital periapical connective tissue and thus an actual space, in itself, will not exist (Fig. 8, right). Third, this tiny orifice is frequently filled by the root canal cementing medium which flows into the space and thus eliminates it (Fig. 6).

FILLING THE "BLUNDERBUSS" CANAL

Fortunately, the clinician is presented with the round tapered canal and minimal apex the majority of the time. Those instances in which special problems exist usually are found in children or young adults where the pulp was devitalized before it had finished the formation of the root end. This situation leaves the wide open apex, or the "blunderbuss" type of canal, to be filled. That an inordinately large number of endodontic failures occur in the young age group attests to the difficulty encountered in obturating a canal of this shape (Fig. 9). A number of years ago Callahan pointed out the necessity for a limiting structure or object at the apex against which the root canal filling might be compressed. He described this as a "thumb over the apex." Periapical soft tissue or inflammatory tissue is no substitute for a closed apex; however, the problem can be solved.

If the canal is perfectly straight or tapered toward the apex, a gutta-percha cone may be "tailor-made" for the canal by rolling baseplate gutta-percha between two warm glass slabs; by trial and error a cone is developed which fits the canal perfectly and may be cemented to place as a single cone (Fig. 10).

If, however, the canal is "blunderbuss" shaped; that is, the apex is wider than

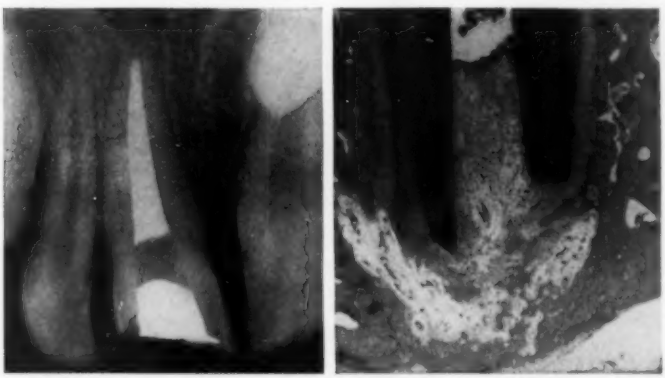

Fig. 8 • Left: Excellent example of canal obturation in spite of open apical foramen. The initial cone was a well blunted gutta-percha point which sealed foramen and prevented overfilling. Careful use of the spreader is also necessary to insure success. Right: "Periapical polyp" of fibrous connective tissues which physiologically occludes the minor apical space which may remain unfilled. (Microphotograph, courtesy Dr. Seiichi Matsumiya, University of Tokyo, Japan)

Fig. 9 • Example of poorly filled root canal with wide open apex. No serious attempt at obturation has been made. This tooth may be salvaged easily by correcting the endodontic errors that have been made

Fig. 10 • "Trial cone" roentgenogram of a "tailor-made" gutta-percha cone rolled of baseplate gutta-percha between two warm glass slabs. Single cone may be cemented to place after chemical sterilization

any possible entering cavity which may be prepared in the crown of the tooth, an entirely different technic of filling must be used. In the most successful method a periapical surgical approach is employed in which the root end is first exposed through the typical surgical window, and after the inflammatory periapical tissue is removed and the bleeding stopped, the root canal is prepared and filled through the standard endodontic cavity in the lingual aspect of the crown (Fig. 11). The surgical approach allows one to figuratively "place one's thumb over the apex." An egg-shaped burnisher is held over the apex to act as a limiting structure against which the root canal filling may be condensed from the crown[10] (Fig. 12).

The "retrograde" technic, popular in Europe, is another solution to this problem. A reverse approach is used in which the clinician fills the surgically exposed apex with amalgam after the canal has been prepared and partially filled. This method, too, has proved fairly successful (Fig. 13).

DISCUSSION

A reiteration of the statement, "one of the two most important procedures in endodontics is the obturation of the root canal," lends emphasis to the necessity for the well filled root canal. Since the majority of endodontic failures are related to the failure to properly fill the canal, it would behoove the profession to perfect this area of endodontic practice. In the perfectly obturated canal the filling materials are confined completely to the canal; however, small extrusions of root canal filling or cement are usually well tolerated by the periapical tissue. Emphasis should also be placed on the necessity of removing all root canal filling materials from the crowns of pulpless

10. Maxmen, H. A. Personal communication, Sept. 1952.

Fig. 11 • Before and after roentgenograms of a "blunderbuss" canal. Before treatment (left) the apical opening is larger than any cavity which can be prepared in lingual aspect of crown. Canal was obliterated (right) by limiting apical opening during filling (see Fig. 12)

Fig. 12 • Egg-shaped burnisher used to limit the size of the apex in filling a "blunderbuss" canal. Initial approach was surgical, followed by canal filing and sterilization. Final stage consists of canal obturation by the multiple cone technic, smoothing off apex and suturing surgical flap back to place

Fig. 13 • Retrograde filling technic used to obturate flaring apex. After blunderbuss apexes are surgically exposed and hemorrhage arrested the canals are instrumented and sterilized through the standard lingual cavity approach. Crowns are filled with oxyphosphate of zinc cement and root fillings are completed by condensing amalgam into the canals from the apex. No amalgam should extend below gingival level. Amalgam crumbs invariably remain but are well tolerated by the tissues

teeth. Silver-containing root canal cements or silver cones are especially prone to stain the crown of the pulpless tooth.

CONCLUSIONS

1. A recent two year study has revealed that 97.26 per cent of the cases of endodontic treatment considered were successful.

2. The majority of endodontic failures are related to the incompletely filled root canal.

3. Periapical inflammation (granuloma) is not necessarily infected, but is more than likely caused by necrotic toxins from the unfilled or poorly filled canal.

4. The ideal root canal should be prepared to a round tapering shape and with a minimal apical opening.

5. The two most common methods of filling the pulpless canal employ either silver or gutta-percha cones used in a single or multiple cone technic.

6. The "blunderbuss" canal may be obturated by combining the root canal therapy with a periapical surgical approach.

Determination of monomer content of polymethyl methacrylate

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In the dental profession methyl methacrylate resin is used extensively as a denture base, a filling material, and for artificial teeth. Since in practice the conditions of polymerization vary greatly, depending on how the resin is utilized, it is possible to anticipate that in certain instances there would be incomplete polymerization and excessive residual monomer. Residual monomer in the polymer reduces the strength of the resin since the monomer acts as a plasticizer. It also leads to oxidative degradation and possible discoloration. Thus, it is important to be able to determine quantitatively the residual monomer and other volatile matter in polymethyl methacrylate.

Several procedures based on determination of unsaturation[1-3] have been adopted for estimation of the monomer content of methyl methacrylate resins. Two of the methods for determining monomer[4,5] involve the titration of polymer solutions, while a third[6] consists of a separation of monomer from the polymer solution and a subsequent titration. Smith and Bains[7] determined residual monomer in denture base resin by using a titration method. Loshaek and Fox[8] utilized infrared absorption characteristics to analyze thin films of polymethyl methacrylate.

This paper describes methods for the determination of the volatile matter and the monomer content of methyl methacrylate resins. The volatile matter, largely residual monomer and water, is determined by an initial and final weighing before and after sublimation of a solution containing the polymer. The methyl methacrylate monomer in the sublimate is estimated by measuring the absorption at a suitable wavelength in the infrared range.

PROCEDURE

Determination of Volatile Matter • The procedure for determination of volatile

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†Chemist, polymer structure section, National Bureau of Standards.

‡Chemist, radiometry section, National Bureau of Standards.

1. Rowe, R. G.; Furnas, C. C., and Bliss, H. An iodine number method for tall oil. Ind. & Eng. Chem., Anal. Ed. 16:371 June 1944.

2. Bricker, C. E., and Roberts, K. H. Determination of end unsaturation in organic compounds. Anal. Chem. 21:1331 Nov. 1949.

3. Wijs, J. J. A. Zur Jod-Additionsmethode. Ber. deutsch. chem. Gesellsch. 31:750, 1898.

4. Steck, N. S. The determination of residual monomer equivalent in methacrylate resins. Presented before the International Association for Dental Research, March 1953.

5. Caul, H. J., and Schoonover, I. C. Method of determining the extent of polymerization of acrylic resins and its application to dentures. J.A.D.A. 39:1 July 1949.

6. DelNogare, S.; Perkins, L. R., and Hale, A. H. Determination of methyl methacrylate by oxidation titration. Anal. Chem. 24:512 March 1952.

7. Smith, D. C., and Bains, M. E. D. Residual methyl methacrylate in the denture base and its relation to denture sore mouth. Brit. D. J. 98:55 Jan. 18, 1955.

8. Loshaek, S., and Fox, T. G. Cross-linked polymers. I. Factors influencing the efficiency of cross-linking in copolymers of methyl methacrylate and glycol dimethacrylates. J. Am. Chem. Soc. 75:3544 July 1953.

matter is a modification of the frozen benzene method of Lewis and Mayo.[9] A weighed specimen (0.5 ± 0.1 Gm.) of polymer is dissolved in a tared weighing bottle (50 ml. capacity) in 30 ml. of benzene. The weighing bottle and its contents are put in a vacuum desiccator. The solution is placed in a low temperature refrigerator and frozen by maintaining a temperature of —30° C. overnight. An oil pump is used to reduce the pressure to less than 1 mm. of mercury and the solution is warmed to 0 ± 3° C. The frozen specimen is maintained at this temperature and pressure for 24 hours, then is heated to room temperature. After 24 hours at room temperature and low pressure, the temperature is raised to 60° C. At this temperature all volatile matter is pumped off for a period of ten days. The percentage of volatile matter can be calculated from the specimen weight change.

Determination of Monomer • To determine the monomer content, the weighed specimen (1.0 ± 0.1 Gm.) is placed in the specimen tube (B in Fig. 1) and 10 ml. of benzene is added. A silicone high-vacuum grease is put on the upper portion of the ground glass joint of the cap (D, Fig. 1) and the cap placed on specimen tube "B" to prevent evaporation. After the polymer has dissolved, the cap is replaced with the sublimation head (A, Fig. 1). The stopcock (C, Fig. 1) is closed to avoid condensation of water in the apparatus. The solution is frozen in a chloroform-dry ice slurry (—63°C.); this can be done in about 15 minutes. The pressure is reduced to less than 1 mm. of mercury with an oil pump and the stopcock is closed so as to isolate the system. Chloroform-dry ice slurry is put in the trap and the frozen benzene solution is warmed by transferring the apparatus to an ice water bath. Sublimation is allowed to occur for two hours and then the apparatus is transferred to a water bath which is maintained at 65° ± 5°C. for one and a half hours. The dry ice-chloroform slurry is emptied from the trap. The vacuum is released and the apparatus is held in a slightly inverted position so that the sample tube "B" is a little higher than the sublimation head "A." This is done so that as the sublimate is melted it will collect in the sublimation head and not redissolve the dry sample. If the specimen tube is turned too high above the sublimation head, there is likelihood that the dried specimen will slide into the sublimation head and dissolve in the melted sublimate.

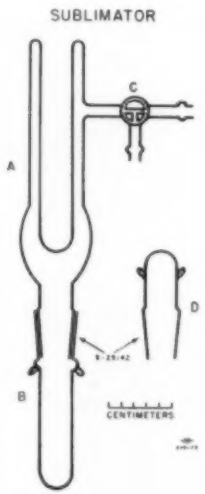

Fig. 1 • The cap "D" prevents evaporation as the specimen is being dissolved in benzene in the specimen tube "B." During sublimation the trap in "A" is cooled to –63° C. The stopcock "C" is used to evacuate the system and then isolate it

An infrared double-beam spectrophotometer, Perkin-Elmer model 21, was used to determine the quantity of methyl methacrylate monomer in the unknown samples. For calibration purposes, a series of benzene solutions containing known

9. Lewis, F. M., and Mayo, F. R. Precise method of isolation of high polymers. Ind. & Eng. Chem., Anal. Ed. 17:134 March 1945.

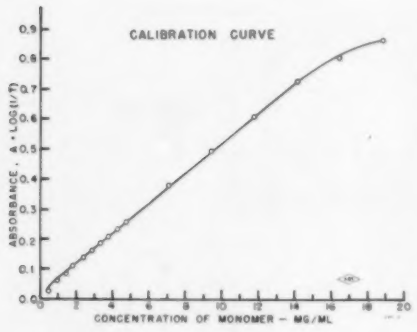

Fig. 2 • Relation of infrared transmittance (at 5.78 microns) to methyl methacrylate monomer. The absorbance is plotted against the monomer concentration in a solution of benzene. Beer's law holds very closely for concentrations from 1 to 12 mg. per milliliter of solution

amounts of monomer was prepared that ranged from 0.5 to 19 mg. per milliliter in concentration. The transmittance for each solution was determined in a 0.1 mm. sealed potassium bromide cell at 5.78 microns. A sodium chloride cell may be used. At this wavelength, methyl methacrylate has a strong carbonyl absorption band while the benzene has none.

The transmittance of benzene alone was also determined in the same 0.1 mm. cell, and the ratio of the transmittance of the solution to that of benzene yielded the transmittance value of the pure monomer. The same cell was used for both transmittance measurements because this method eliminated errors due to cell thickness and also compensated for reflection and absorption losses in the cell. The absorbance, $A = \log 1/T$, was then calculated. In accordance with Beer's law, "A" is a linear function of the concentration of monomer. A calibration curve of the absorbance against concentration was plotted (Fig. 2). The points on the curve are the average of three observations. Between 1 and 12 mg., the curve is a straight line. Below 1 mg. and above 12 mg. the curve deviates from linearity. The accuracy can be improved below 1 mg. by resorting to thicker cells, and above 12 mg. by diluting the specimens until the concentration is in the linear range.

The same procedure can be used to determine the transmittance of the unknowns, and the concentration can then be read from the curve. A standard solution containing 2.8 mg. per milliliter of methyl methacrylate was used routinely to check the procedure and apparatus. In all instances the result was within 0.1 mg. per milliliter of the actual amount, corresponding to an error of about 0.1 per cent in the residual monomer content of polymer.

RESULTS AND DISCUSSION

Volatile matter is determined by weighing the undissolved specimen and the expanded residue after sublimation. Volatile matter is largely residual monomer and water. Although this determination requires nearly three weeks to complete, the man-hours of work involved are few. After the specimen has been dissolved, the residual monomer content may be estimated in less than one day by measurement of the degree of infrared absorption exhibited by the sublimate.

The first fractions of sublimate were richer in monomer than would be expected from the vapor pressures of benzene and methyl methacrylate[10] at 0°C. (approximately 24 and 8 mm. of mercury, respectively), assuming both components were in a single phase. Apparently most of the benzene is solidified at this temperature and the monomer becomes concentrated in a liquid phase. Thus a heterogenous system results and monomer-rich fractions are obtained in the early stages of the process.

Table 1 shows the results of evaporating a solution of benzene containing 2.8

10. Bywater, S. Vapor pressures of methyl methacrylate and styrene. J. Polymer Sci. 9:417 Nov. 1952.

mg. methyl methacrylate per milliliter of solution at reduced pressure and at room temperature. These results appear to be entirely normal, since the concentration reaches a maximum in the last fraction. The results of sublimation of a solution of the same concentration are shown in Table 2.

Most of the monomer has been sublimated when the first half of the sublimation has been completed. This fact is useful. Complete sublimation down to the last 0.1 ml. is not necessary for determination of monomer. When 90 per cent of the solvent has been sublimated, 99 per cent of the monomer has been collected. Under these conditions errors will be primarily volume errors rather than errors caused by monomer-rich residuals after sublimation.

Table 3 gives the volatile and monomer content of specimens made from a powder (polymer) of a direct (self-curing) filling resin and commercial monomer to which known amounts of a promoter, dimethyl-p-toluidine, were added. In each case the monomer content (the last column) is less than the volatile matter content (column 3). This is to be expected since the volatile matter should include both methyl methacrylate monomer and water. The other point of interest in Table 3 is that the residual monomer content decreases as the amount of promoter increases. Apparently the amount of polymerization increases with increased promoter content.

Table 1 • Evaporation at room temperature of a benzene solution containing 2.8 mg. of methyl methacrylate monomer per milliliter

Fraction number	Volume (ml.)	Concentration of monomer (mg./ml.)
1	1.21	2.1
2	0.75	2.4
3	1.10	2.4
4	1.14	2.4
5	1.79	2.4
6	1.25	2.8
7	1.38	3.8
8	0.70	5.7

Table 2 • Sublimation at 0°C. of a benzene solution containing 2.8 mg. of methyl methacrylate monomer per milliliter of solution

Fraction number	Volume (ml.)	Concentration of monomer (mg./ml.)
1	1.61	7.9
2	1.73	3.7
3	1.31	1.2
4	1.00	0.6
5	2.14	0.6
6	0.96	0.2

Table 3 • Volatile matter and monomer content of polymethyl methacrylate specimens made with monomer containing various amounts of dimethyl-p-toluidine*

Specimen no.	Amount of dimethyl-p-toluidine in monomer (%)	Volatile matter (%)	Monomer (%)
1	0.50	2.4	1.7
2	0.25	3.6	2.6
3	0.20	4.1	3.1
4	0.15	5.3	3.5
5	0.10	6.8	5.7

*These specimens were made by mixing 0.45 ml. of monomer with 1.0 Gm. of polymer powder. Polymerization occurred at room temperature (22°C.).

SUMMARY

Determination of volatile matter by weight loss gives values higher than the monomer content. This is probably due to water. Determination of the residual monomer content is accomplished by using a dry-freeze sublimation process in which the sublimate is analyzed for monomer by infrared spectra. This method assumes that all the carbonyl group (C=O) present is in the methyl methacrylate monomer.

Relationship between residual monomer and some properties of self-curing dental resins

Harold J. Caul, B.S.; William T. Sweeney,† A.B., and George C. Paffenbarger,* D.D.S., Washington, D. C.*

The self-curing acrylic resins are now offered to the dental profession for several purposes including uses as cements, denture bases, denture base liner and repair materials, and direct filling materials. These compounds contain various catalysts and promoters that have a pronounced effect on the polymerization reaction and the amount of monomer remaining in the cured resin.

It is generally accepted in polymer chemistry that larger molecules are produced as the temperature of polymerization is decreased. On the other hand, as the temperature of polymerization is decreased, the amount of monomer converted to polymer is decreased. Figure 1 shows that as the temperature starts rising because of the polymerization reaction, the maximum or peak temperature occurs in a matter of minutes. As the peak temperature increases, the time to reach it decreases.

This investigation was undertaken to determine the relationship between residual monomer content and the physical properties of the self-curing resins.

MATERIALS AND TEST PROCEDURES

The materials studied in this investigation grouped according to their use are listed in Table 1.

The peak temperature during polymerization and its time of occurrence were determined on cylindrical specimens (200 cu. mm. in volume) according to the procedure outlined by Wolcott, Paffenbarger and Schoonover.[1]

The residual monomer content was determined by the method of Caul, Wall and Acquista[2] using the frozen-benzene infrared method on specimens at least two days old.

The yield strength, indentation strength and modulus of elasticity were determined according to the methods outlined by Sweeney, Sheehan, and Yost.[3] Values of indentation strength are included in this report for two reasons. First, it is a very convenient method of measuring the strength of small specimens and, second, the value for indentation strength should be comparable to yield strength.

*Research associates, National Bureau of Standards Fellowship Division of the Council on Dental Research, American Dental Association.

†Chief, dental research section, National Bureau of Standards.

1. Wolcott, Robert B.; Paffenbarger, G. C., and Schoonover, I. C. Direct resinous filling materials: temperature rise during polymerization. J.A.D.A. 42:253 March 1951.

2. Caul, Harold J.; Wall, Leo A., and Acquista, Nicolo. The determination of monomer content of polymethyl methacrylate. Page 56, this issue.

3. Sweeney, W. T.; Sheehan, W. D., and Yost, E. L. Mechanical properties of direct filling resins. J.A.D.A. 49:513 Nov. 1954.

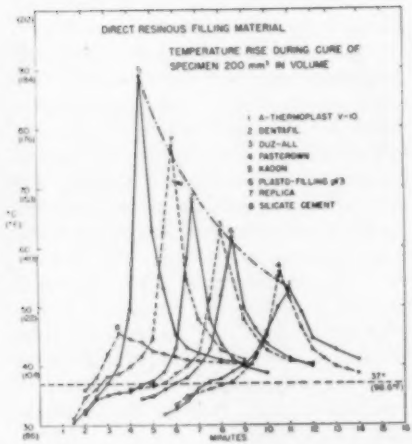

Fig. 1 • Relationship between temperature rise and curing time of self-curing dental filling resins

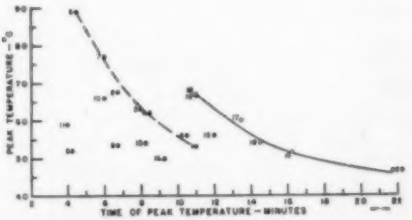

Fig. 2 • Peak temperature of self-curing resins. Broken curve is the same as that shown in Figure 1. Solid curve on right shows that there is a relation between peak temperature and its occurrence for the experimental resins in which promoter content was varied. Identifying numerals for each point are the same as those in Table 1. Solid circles are commercial brands of self-curing resins while open circles are the experimental resins listed in Table 1

Table 1 • Materials studied, grouped according to use

Identifying number	Brand		Type
1	A-Thermoplast V-10		
2	Dentafil		
3	Duz-All		
4	Fast Crown		
5	Kadon		Direct filling resins
6	Plasto-filling pf 3		
7	Replica		
8	Sevriton		
9	Swedon		
10	Texton		
11	P.F.		
12	Dura Base		Denture base reliner
13	Dura Cement		Resin cements
14	Acrynamel		
15	Staweld		Denture base repair
	Duz-All polymer + methyl methacrylate monomer	Amount of dimethyl-p-toluidine based on monomer	
16	"	0.50%	Experimental resins
17	"	0.25%	
18	"	0.20%	
19	"	0.15%	
20	"	0.10%	

RESULTS AND DISCUSSION

Figure 2 shows the relation between peak temperature and time to reach it for the materials investigated. This graph includes data from the Wolcott report as well as more recent data obtained by use of their technic. A single smooth curve cannot be used to cover all points since the results are too scattered.

As many of these materials contain different promoters, cross-linking agents,

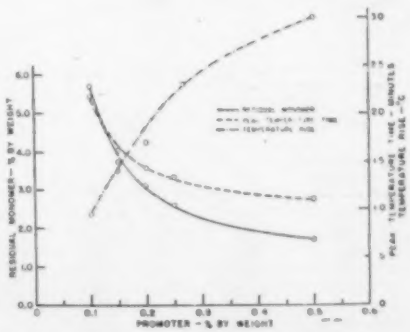

Fig. 3 • Effect of promoter concentration on amount of residual monomer, peak temperature time and temperature rise

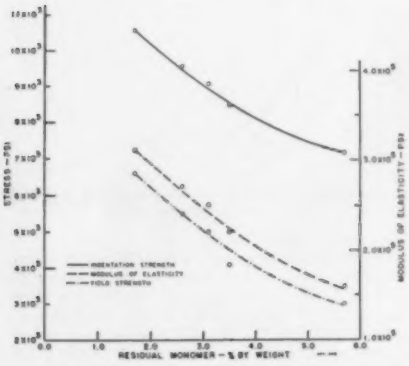

Fig. 4 • Effect of residual monomer on modulus of elasticity and indentation and yield strengths of self-curing resins

fillers, polymers and monomers, a single smooth curve would not be expected to fit the data.

The behavior of one material with various amounts of a promoter was investigated. Specimens were prepared with Duz-All polymer (a direct filling resin), methyl methacrylate monomer and dimethyl-p-toluidine (a promoter); the compositions are shown in Table 2. The peak temperature during polymerization and the time to reach it are shown as open circles in Figure 2. A smooth curve can be drawn through these data.

The monomer content, modulus of elasticity, yield strength, and indentation strength were determined for the specimens made with the various concentrations of promoter. These data are presented in Table 2. The interrelationships are shown graphically in Figures 3 and 4.

Figure 3 shows the relationships between the amount of promoter and (1) the peak temperature, (2) time to reach peak temperature, and (3) the amount of residual monomer. An increased amount of promoter results in higher peak temperature, but shortens the time to reach it. The higher temperature peaks force the polymerization more nearly to completion and reduce the residual monomer content.

Figure 4 shows that as the amount of residual monomer increases, the modulus of elasticity and yield and indentation strengths decrease.

SUMMARY AND CONCLUSIONS

When a direct filling resin polymer is mixed with methyl methacrylate monomer containing dimethyl-para-toluidine promoter, polymerization will occur at room temperature in a relatively short time.

The peak temperature during polymerization and the time to reach this temperature were investigated for 15

Table 2 • Properties of acrylic resins prepared with different amounts of promoter

Promoter*	Residual monomer†	Temperature rise‡§	Time to peak temperature‡	Modulus of elasticity‡	Yield strength‡	Indentation strength†
% (based on monomer)	%	°C.	min.	10^3 psi	10^3 psi	10^3 psi
0.50	1.7	30 ± 2.5	11.0 ± 0.3	3.1 ± 0.1	6.6 ± 0.1	10.6
0.25	2.6	23 ± 1.9	13.3 ± 0.4	2.7 ± 0.1	5.5 ± 0.4	9.6
0.20	3.1	17 ± 2.8	14.3 ± 0.5	2.5 ± 0.1	5.0 ± 0.4	9.4
0.15	3.5	14.5 ± 2.1	16.2 ± 0.4	2.2 ± 0.2	4.1 ± 0.3	8.5
0.10	5.7	9.5 ± 1.3	21.8 ± 1.8	1.6 ± 0.1	3.0 ± 0.4	7.2

*The values are the amount of dimethyl-para-toluidine present in the monomer (Rohm and Haas methyl methacrylate inhibited with 0.006% hydroquinone). The specimens were prepared by mixing 0.45 ml. of monomer, containing the listed amount of promoter, with 1.0 Gm. of the Duz-All polymer in powdered form.

†These values are the average of two determinations.

‡These values are the average of five determinations; the ± figures are standard deviations.

§Temperature rise = peak temperature −37°C.

brands of self-curing dental resins and for a self-curing resin containing known amounts of dimethyl-p-toluidine.

Values for residual monomer, peak temperature, time to reach peak temperature, modulus of elasticity, yield strength, and indentation strength were determined on samples of resin prepared from one polymer with monomer containing different amounts of promoter. It was shown that all of these factors and properties are interrelated.

As the amount of promoter is decreased, the temperature rise during polymerization decreases while the residual monomer and time to reach peak temperature increase. As the residual monomer increases, such physical properties as modulus of elasticity and yield and indentation strengths decrease.

Authors and Notebooks • I forget who it was who said that every author, writer or scientist, should keep a notebook, but should take care never to refer to it. If you understand this properly, I think you will find the truth in it. By making a note of something important that strikes you, you separate it from the incessant stream of impressions that crowds across the mental eye, and perhaps fix it in your memory. All of us have had good ideas of vivid sensations that we thought one day will be useful, but which, because we were too lazy to write them down, have now escaped us entirely. When you know you are going to make a note of something, you look at it more attentively than you otherwise would, and in the process of doing so the words are created and formed that will give them their individual place in reality. The danger of using notes is that you may find yourself inclined to rely on them, and so lose the even and natural flow of your own writing which comes from allowing the unconscious self that full activity which is sometimes pompously known as inspiration.—*W. Somerset Maugham, "A Writer's Notebook," Doubleday & Co., 1956.*

COUNCIL ON DENTAL THERAPEUTICS

The status of local antibiotic therapy in dental infections, with particular reference to penicillin

Count D. Gibson, Jr., M.D., and Holmes T. Knighton, D.D.S., Richmond, Va.

The continued widespread use of penicillin and other antibiotics as a local application in the oral cavity, despite blanket condemnation of this practice by several leading authorities,[1,2] prompts a further inquiry into this controversial question.

PENICILLIN

The chief role of penicillin lozenges and similar preparations is found in the symptomatic control of necrotizing ulcerative gingivitis, while the patient is being readied for local dental care.[3-5] At the same time, it has been demonstrated that similar relief can be obtained by the systemic administration of penicillin.[6] It may be accepted, therefore, that no unique and indispensable status exists for local antibiotic therapy in this condition. It is necessary, however, to find convincing evidence of hazard from such practices before discarding this inexpensive and easily administered type of treatment.

The gross reported incidence of reactions to local penicillin in the mouth varies from 5 per cent to 38 per cent. In a carefully controlled study, Kutscher and co-workers[7] observed a reaction rate of 38 per cent in a series of patients using penicillin troches compared to a 14 per cent reaction rate in the placebo series. Eleven per cent of the patients in the penicillin series developed a reaction severe enough to require cessation of therapy. Such reactions include glossitis, cheilitis, "hairy tongue" and an occasional instance of overt hypersensitivity.

The exact relation of locally applied penicillin to hypersensitivity remains obscure. The confusing and contradictory reports of various investigators relate to many factors including size of dose, duration of therapy and the year in which the study was performed. It is assumed that the incidence of penicillin allergy in the population is steadily increasing. Thus, the first death from penicillin ana-

This paper has been approved for publication by the Council on Dental Therapeutics.

From the Schools of Medicine and Dentistry, Medical College of Virginia.

1. Queries and Comments. Antibiotic lozenges. J. Oral Surg. 13:169 April 1955.

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3. Goldman, H. M. Periodontia, ed. 3. St. Louis, C. V. Mosby Co., 1953, p. 664.

4. Glickman, I. Clinical periodontology. Philadelphia, W. B. Saunders Co., 1953, p. 840-842.

5. Miller, S. C. Textbook of periodontia, ed. 2. Philadelphia, Blakiston Co., 1950.

6. Hoppe, W. E., and Meyer, G. E. Use of penicillin in the treatment of Vincent's infection and its subsequent oral disturbances. J. Oral Surg. 4:304 Oct. 1946.

7. Kutscher, A. H., and others. Reactions following the use of Aureomycin and procaine penicillin troches: a controlled study. J. Allergy 24:164, 1953.

phylaxis was not reported until 1948, and the frequency of such reports has steadily increased since that date.

The practitioner is actually more concerned that local penicillin applications may sensitize the patient to future use of penicillin, regardless of the reactions which may occur during the original course of therapy.

Theoretically, the ideal mechanism for induction of hypersensitivity to any antigen is by the prolonged contact of the antigen in high concentration with one specific group of cells. This situation is best fulfilled by the topical use of penicillin and least fulfilled by its oral ingestion.[8] On the other hand, severity of reaction in a hypersensitive individual is greatest when the antigen rapidly enters the blood stream. Thus, in the allergic patient, parenteral administration of penicillin is most dangerous, oral administration next, and local use least.

In conclusion, it appears that, despite their proved efficacy, local penicillin applications enjoy no indispensable role in treating dental infections, and further, that their use provides the greatest possibility of producing hypersensitivity to the most useful antibiotic. Therefore, we believe that the use of penicillin solutions, pastes, troches, pastilles and the like should be discontinued.

In the past, the systemic use of penicillin by the dentist has been circumscribed by the extra nuisance of injections and the irregular effect of oral preparations. It is possible that the recent introduction of penicillin V as an effective oral drug may resolve these problems satisfactorily for treatment of oral infections amenable to penicillin therapy. It should be stressed, however, that parenteral administration must still be considered the most reliable method for giving penicillin and is recommended as the route of choice, especially for prophylaxis in patients with a history of valvular heart involvement or rheumatic fever.

TETRACYCLINES

No other antibiotic agent has been shown to surpass penicillin in the management of necrotizing gingivitis. Although chlortetracycline, oxytetracycline and tetracycline have been used as local agents with good results in this disease, another study by Kutscher and co-workers[9] reveals a reaction rate of 51 per cent with chlortetracycline troches (placebo reaction 14 per cent) and 54 per cent with oxytetracycline troches (placebo reaction 10 per cent). The additional occurrence of nausea, bad taste and occasional overgrowth of *Candida albicans* in the oral cavity with this type of therapy suggests once again that systemic penicillin administration is a superior modality. In the patient known to be hypersensitive to penicillin, systemic therapy with either the tetracyclines, erythromycin or carbomycin is available.

BACITRACIN, POLYMYXIN B, TYROTHRICIN AND GRAMICIDIN

Although the reaction rate to these agents in a form for local application appears to be virtually nil,[10] critical studies supporting their efficacy in necrotizing gingivitis have not yet appeared. It would, therefore, seem prudent to withhold recommendation of their routine use until satisfactory proof of their effectiveness can be obtained.

8. White, C. B. Reactions to penicillin given orally in mass prophylaxis. U. S. Armed Forces M. J. 4:1606 Nov. 1953.

9. Kutscher, A. H., and others. Reactions following the use of Terramycin troches: a controlled study. J. Allergy 23:177, 1952.

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Council reports on topical dosage forms of penicillin

The attention of the dental profession is called to the Council-sponsored article by C. D. Gibson and H. T. Knighton entitled "The Status of Local Antibiotic Therapy in Dental Infections, with Particular Reference to Penicillin," which appears in this issue of THE JOURNAL.

The Council continues to regard penicillin as the antibiotic of choice for the control of the bacterial factors in oral infections. In dentistry, the use of antibiotics is almost invariably adjunctive to surgical and local manipulative treatment directed toward the elimination of the conditions which permitted the establishment of the infection. Thus, in the case of an abscess, treatment is directed primarily toward drainage; in the case of necrotizing gingivitis (Vincent's infection), effective periodontal scaling and other manipulative operations constitute the primary treatment procedure. Antibiotics often are useful in dental practice in reducing inflammation in the acute stage of an infectious disease. With the subsidence of inflammation after adequate antibiotic therapy, surgical and manipulative treatment may be instituted with less discomfort to the patient, and with significant reduction of the potential hazards associated with introducing bacteria into the blood stream.

The Council has recognized the usefulness of antibiotics in this connection. The Council's preference for penicillin is consistent with the fact that dental infections are most frequently caused by streptococci and other microorganisms against which penicillin is particularly effective, and the fact that a very low order of toxicity is exhibited by penicillin in the unsensitized patient. When the bacteria are resistant to penicillin or when the patient is known to be sensitive to the drug, other antibiotics, such as erythromycin, carbomycin, chlortetracycline, oxytetracycline and tetracycline, may be administered as a second choice.

The effects of penicillin may be obtained by systemic administration, more particularly in the case of deep-seated infections but also in superficial infections of the oral tissues. With adequate systemic doses, the drug is circulated in therapeutic concentration and its effectiveness is prolonged. In superficial infections, penicillin reaches the site partly by diffusion from the blood through the underlying tissues and partly by way of the saliva, into which significant amounts are excreted. The Council believes that, where the use of penicillin is indicated, satisfactory results are obtained through the use of systemic dosage forms.

For some time, the Council has accepted for listing in *Accepted Dental Remedies* such topical dosage forms of penicillin as troches, lozenges, ointments, pastes, powders or dental cones, for the treatment of infected superficial tissues or postextraction sockets.

Recently it has become increasingly evident that serious results may ensue following exposure to penicillin in individuals who have been sensitized through previous contact with the drug. Sensitization is believed to be most readily developed by several days' exposure of epithelial tissue to the sensitizing agent. When topical dosage forms of penicillin are administered over a period of several days, these conditions are established in the patient under treatment. If the patient has an allergic diathesis, penicillin sensitivity is likely to develop.

Since the ability to employ penicillin for systemic effect is of extreme importance in the prophylaxis and treat-

ment of serious infections, the Council regards the hazard of sensitization as one of sufficient magnitude to justify the recommendation that the use of topical dosage forms of penicillin in dentistry should be discontinued. The Council therefore has voted to classify penicillin troches, lozenges, ointments, pastes, topical powders and dental cones in Group D. Accordingly, brands of these dosage forms will be deleted from future editions of *Accepted Dental Remedies.*

In this action the Council was also influenced by the availability of other antibiotics the use of which is restricted to local application. Preparations containing these antibiotics are being reviewed by the Council.

Council classifies Hemolox brand of Alginic Acid Type Hemostatic Agent in Group B

The hemostatic properties of alginic acid preparations have received attention in the scientific literature.[1-5] Hemostasis results from the formation of an alginate gel when the material comes into contact with soluble elements of the blood. Through its physical characteristics, the gel contributes to the control of capillary hemorrhage; there appears to be no significant interference with, or participation in, the normal blood clotting mechanism.

Hemolox, a brand of Alginic Acid Type Hemostatic Agent, is marketed by Coe Laboratories, Inc., Chicago, as a powder to be applied by means of an insufflator for the control of hemorrhage after certain oral surgical procedures. The product is stated to contain alginic acid, 97 per cent, with chlorophyllin salts, 2 per cent for color, and acacia, 1 per cent.

Several published reports support the usefulness of the product in dental practice.[6-8] The safety of the product was investigated by application of the mixture to experimental wounds in animals. Histological studies revealed no evidence of adverse effects on the healing of fractures or soft tissue wounds when the product was applied in the recommended manner. Details of this unpublished study are on file in the Council office.

In the opinion of consultants to the Council, the bleeding which follows tooth extraction ordinarily can be controlled through the normal blood clotting mechanism. Hemostatic agents may be useful, however, when the control of postoperative bleeding is difficult.

The Council has not recognized the usefulness of the chlorophyllins except as coloring agents.

In consideration of the available evidence, the Council has voted to classify Hemolox brand of Alginic Acid Type Hemostatic Agent in Group B. It is the policy of the Council to reconsider Group B products each year on the basis of new evidence which may be produced in their support.

1. Smith, C. A. H. A new and effective hemostatic agent. Science 103:634 May 17, 1946.

2. Blaine, George. Experimental observations on absorbable alginate products in surgery. Ann. Surg. 125:102 Jan. 1947.

3. Frantz, Virginia K. Experimental studies of alginates as hemostatics. Ann. Surg. 127:1165 June 1948.

4. Chenowith, M. B. The toxicity of sodium alginate in cats. Ann. Surg. 127:1173 June 1948.

5. Swinburn, P. F. The effect of alginate gauze on the healing of extraction wounds. New Zealand D. J. 48:151 July 1952.

6. Ammons, C. A. Investigation of the value in the use of alginic acid following surgery of the mouth. Northwest. Univ. Bul. 50:9 March 13, 1950.

7. Lavieri, J. P. A clinical investigation of the topical use of alginic acid following the extraction of teeth. Northwest. Univ. Bul. 53:14 Dec. 22, 1952.

8. Drebes, R. G. The effect of coating blood clots formed in extraction wounds with a mixture of alginic acid and chlorophyl. Northwest. Univ. Bul. 53:17 Dec. 22, 1952.

Council announces classification of additional products

The classification of products by the Council on Dental Therapeutics has been described in a previous report (J.A.D.A. 40:489 April 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically, and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration, the items conformed with the provisions for acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees and the House of Delegates of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies* and may use the Seal of Acceptance, unless otherwise provided.

The following additional product is classified in Group A:

Thimerosal, N.F. (See A.D.R., ed. 21, p. 46)

Tincture Merthiolate 1:1,000 (Eli Lilly and Company): A tinted solution of thimerosal, 0.1 per cent in a mixture of acetone 10 per cent, alcohol 50 per cent, and water.

GROUP B

Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental Therapeutics. It is the Council's opinion that Group B products may be promoted for special use and study.

The Council's initial consideration of products which may be eligible for Group B listing is influenced favorably by the knowledge of further investigations then in progress. It is the policy of the Council to reconsider Group B products each year on the basis of new evidence which may be produced in their support. Classification in this category is not ordinarily continued for more than three years.

The following additional product is classified in Group B:

Alginic Acid Type Hemostatic Agents (See report on page 67.

Hemolox Brand of Alginic Acid Type Hemostatic Agent (Coe Laboratories, Inc.): Stated to contain alginic acid, 97 per cent, with chlorophyllin salts, 2 per cent for color, and acacia, 1 per cent.

GROUP C

Listing of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

GROUP D

Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

The following additional class of products is classified in Group D:

Topical dosage forms of penicillin, including troches, lozenges, ointment, pastes, topical powders and dental cones. (See report on page 66).

COUNCIL ON INTERNATIONAL RELATIONS

The Federation Dentaire Internationale

Why the Fédération Dentaire Internationale? Why should it be supported and what does it do for dentistry? Some dentists may find it difficult to answer these questions, but the foundation for a prompt and favorable response is very evident.

The F.D.I. is dentistry at the world level. Here are approximately 50 national dental associations representing approximately 50 nations of the world banded together, meeting regularly, and openly presenting their problems for discussion and solution. Here can be found approximately 3,500 individual dentists from all parts of the world enrolled as "supporting members" of the F.D.I., who analyze individually and collectively the phases of world dentistry pertaining to the individual dentist and to his associations, and who, by pooling their analyses, determine the policies of the organization.

A complete survey of dentistry in the United States has long been considered. Such a survey, it is reasoned, will provide answers to many dental problems. For instance, are more dentists needed? Are any particular phases of dentistry being overemphasized? Is the problem of auxiliary help being dealt with wisely? What will the demand for dentistry be in 1970?

The question may be raised, "What has the F.D.I. to do with these questions? How can it be of value in answering them?" If a dentist ever sits in on an F.D.I. meeting, he will have at least an inkling as to some of the answers. Here can be found dentistry at all levels of development. Here some of the phases are overemphasized, with the results of overemphasis very evident. Here some types of dentistry are very much neglected, and the result of such neglect is very evident. Here are lay-controlled dental health programs discussed, some of which are developing and some perishing. Here can be seen various aspects of government control, with basic evidence of the results so far as the public, the profession and the individual are concerned. Here information can be gained regarding some unusually strong research programs, some conducted by groups and institutions and some by an unusually large number of individual dentists. In other words, here in these F.D.I. meetings can be seen a panorama of dentistry worthy of the most serious consideration when plans for activating individual dental practices are being formulated and also when organized groups in this country are developing their policies.

Not every dentist can sit in on these international programs. But a representative group of dentists from each country can attend each meeting and can carry back to their fellow practitioners and their dental organizations the basic thinking and conclusions from such meetings. Even though every dentist may not be fortunate enough to attend an F.D.I. meeting or to contact a representative who has, he may obtain information regarding the work and contributions of the international organization through publications of the F.D.I. The F.D.I. *News Letter* gives unlimited information in brief form from the world of dentistry to all F.D.I. members regularly. The *International Dental Journal* reports on studies that have been described in tens or even hundreds of articles published in all parts of the world; studies dealing with dental science, literature and organization. These studies are grouped so that they can be compared and analyzed at annual F.D.I. meetings and at the

International Dental Congress which is sponsored by the F.D.I., and is held every fifth year.

The World Health Organization has some fine accomplishments to its credit throughout the world in the realm of general health. As the second largest health organization in the world, dentistry certainly should be represented in the activities of W.H.O. The only entree into W.H.O. as a profession is through F.D.I. That fact alone justifies support of F.D.I. as a "supporting member."

Dentistry, in order to continue advancing, must face worldwide problems as they present themselves. A consideration of dentistry at the international level has therefore become a positive must. Several thousand dentists should support this program and thereby acquire information which, through organized effort, they can pass on to their colleagues.

Supporting membership in F.D.I. is available to all members of the American Dental Association at $10 annually. All requests for information or membership applications will receive immediate attention. All such requests should be addressed to Obed H. Moen, F.D.I. treasurer for U.S.A., 6 Main St., Watertown, Wis.

Obed H. Moen, secretary

BUREAU OF LIBRARY AND INDEXING SERVICE

The American Dental Association Film Library

The Film Library circulates not only films and filmstrips but also 2 by 2 slides which can be used for the education of patients in a dental office or dental clinic, for dental societies, study clubs, dental schools, armed services, community and civic groups.

The slides on preventive dentistry, reviewed in this article, have been prepared for use in the Navy's dental health education program by Capt. Charles T. Pridgeon under the sponsorship of the Bureau of Medicine and Surgery of the Department of the Navy. They are available for rental ($1.50) from the Film Library and for purchase ($1 each for color, $.55 each for black and white or $28.20 per set) from the Order Department of the American Dental Association, 222 E. Superior St., Chicago. It is suggested that all slides be reviewed prior to purchase.

Since the number of sets of slides is necessarily limited, it is suggested that program chairmen plan their programs far enough in advance to insure availability.

SLIDE REVIEW

S28 *Do It Yourself* • 30 slides, 26 color, 4 black and white, with guide. Prepared by Capt. Charles T. Pridgeon, D.C. for the Bureau of Medicine and Surgery, Department of the Navy.

The purpose and content of the slides, according to its producer, are: (1) to make the patient periodontally minded, (2) to demonstrate visually the nature, recognition and damaging effect of periodontal diseases, (3) to teach the value of home care, (4) to describe simple but effective measures for home care, and (5) to impress on the patient his responsibility in the prevention and control of periodontal diseases.

The slides depict periodontal structures from the normal through the various stages of periodontal lesions, from simple marginal gingivitis to extensive periodontitis. Each lesion photographed for teaching purposes is augmented

with a cross-section drawing to describe what takes place in the supporting structures. The regions in which gingival inflammation commonly has its beginning are also depicted. Finally, some slides showing the results of good home care are shown.

This series is well organized. The use of photographs, drawings, and roentgenograms increases its instructional value. It is especially suitable for patient education in a dental office. Dental societies actively engaged in preventive dentistry programs may also find it helpful to use them in connection with talks before community and civic groups. The Association is investigating the possibility of having tapes made from the narrations prepared by the producer so that these may be sold with the slides.

COUNCIL ON DENTAL RESEARCH

Revision of list of certified dental materials

Since the publication of the most recently revised List of Certified Dental Materials Revised to November 1, 1955, (J.A.D.A. 52:58 Jan. 1956) the certified impression compounds were retested for compliance with American Dental Association specifications. The following materials conform to American Dental Association Specification No. 3 for Impression Compound.

CERTIFIED IMPRESSION COMPOUNDS
(A.D.A. SPECIFICATION NO. 3, FIRST REVISION)

Compound	*Type*	*Manufacturer or distributor*
Certified	I	Lee Smith Co.
Exact	I	The S. S. White Dental Mfg. Co.
Kerr Perfection; No. 2 Soft Green; Grey; White; Black	I	Kerr Mfg. Co.
Mizzy-Low Heat	I	Mizzy, Inc.
S.S. White-Black-Tray	II	The S. S. White Dental Mfg. Co.

Additions to list of certified dental materials

Since the publication of the most recent List of Certified Dental Materials Revised to November 1, 1955, (J.A.D.A. 52:58 Jan. 1956) the following materials which conform to the American Dental Association Specification No. 1 for Dental Amalgam Alloy have been added.

CERTIFIED AMALGAM ALLOYS

Alloy	*Manufacturer or distributor*
Midvalloy	Midvale Dental Supply Co.
Ultra Brand 72% Silver	H. Jelinek Dental Alloys

Processing denture base resins: heat-curing type

A review of the processing instructions that accompany acrylic resin denture base materials shows a wide variety of suggested time-temperature schedules. Some of these instructions are unnecessarily complicated and vague. Consequently, the Council on Dental Research has had this article prepared to review past research and from it to recommend simple standard technics which will give optimum physical properties to the resin.

The hardening of acrylic resins is caused by a polymerization of the monomer remaining in the dough after the mold is packed. Therefore, it is essential that the processing technic be directed toward the most satisfactory method of converting this monomer into solid resin. During this conversion heat is liberated, causing the resin to rise in temperature above that of the water bath. This rise in temperature of the resin dough can be controlled by the time-temperature schedule of the water bath.

Methyl methacrylate polymerizes readily at a temperature of 70 to 75°C. (158 to 167°F.)[1] in the presence of the commonly used catalyst, benzoyl peroxide. At these temperatures the exothermic heat of polymerization begins to be liberated and is added to the external heat supplied by the bath. Taylor[2] in 1941 reported that porosity resulted in cured specimens when an initial processing temperature of greater than 74°C. (165°F.) was used in curing dental acrylic resins. This resulted from the rise in temperature within the specimens of greater than 100.3°C. (212.5°F.), the boiling point[3] of the monomer. Incomplete packing of the mold with resin dough and inadequate compression on the flask were also reported by Taylor as causes of porosity. Sweeney, Paffenbarger and Beall[4] in 1942 demonstrated that, in addition to those causes cited by Taylor, insufficient mixing of the monomer and polymer would also cause porosity. Tuckfield, Worner and Guerini[5] in 1943 demonstrated in order the type and amount of porosity obtained by the causes cited previously. They concluded that while the too-rapid heating, particularly if low clamping pressures were used on the flasked specimen, caused porosity, it was of lesser degree than that attributed to the other causes. Peyton[6] in 1950 also demonstrated increasing porosity in the acrylic resin as the initial temperature of the heating cycle was increased above 74°C. (165°F.).

The strength and stiffness of resins processed by various technics have been determined. Tuckfield, Worner and Guerini[5] in 1943 demonstrated that when artificial dentures were processed for four hours at 66°C. (150°F.), thin portions of the dentures did not have the same transverse strength and stiffness as did thicker portions. When the heating process was carried out for two hours at 66°C. (150°F.) and then at 100°C. (212°F.) for one hour, the strength and stiffness from thick and thin portions of artificial dentures were comparable. They showed that the temperature rise within the resin was greater in the thicker portions, thus giving a more complete polymerization. This higher temperature rise, resulting in greater strength and stiffness in thicker

Prepared for the Council on Dental Research by John W. Stanford and George C. Paffenbarger.

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2. Taylor, P. B. Acrylic resins: their manipulation. J.A.D.A. 28:373 March 1941.

3. Ellis, Carleton. Tailoring the long molecule: plastics. Ind. & Eng. Chem. 28:1130 Oct. 1936.

4. Sweeney, W. T.; Paffenbarger, G. C., and Beall, J. R. Acrylic resins for dentures. J.A.D.A. 29:7 Jan. 1942.

5. Tuckfield, W. J.; Worner, H. K., and Guerini, B. D. Acrylic resins in dentistry. Austral. J.D. 27:172 Sept. 1943.

6. Peyton, F. A. Packing and processing denture base resins. J.A.D.A. 40:520 May 1950.

portions of acrylic resin, was confirmed by Harman[7] and again by Caul and Schoonover,[8] both in 1949. At the same time Harman demonstrated that the stiffness and strength developed by the resin after processing for nine hours at 71°C. (160°F.) was equal to that obtained by processing for one hour at 71°C. (160°F.) and then boiling for 30 minutes. She concluded from her studies that, while the stiffness of the resin increased on longer processing than nine hours at 71°C. (160°F.), the resulting increase was not great enough to warrant it.

Matthews and Tyldesley[9] in 1950 reported on the effects of different curing methods on the mean molecular weights and tensile strengths developed in cured specimens of two resins. They reported that when the specimens were processed by bringing the resins to 100°C. (212°F.) in one half hour and then holding them at 100°C. (212°F.) for one hour, a greater increase in mean molecular weight resulted than if a processing cycle of six hours at 65°C. (149°F.) was used. Both resins then had tensile strengths of greater than 8,000 lb. per square inch. The investigators concluded that longer boiling than one hour neither raised the mean molecular weight nor the tensile strength enough to warrant the extra processing.

Johnson and Matthews[10] in 1952 later demonstrated that the fatigue resistance of acrylic resin also was higher when processed at 100°C. (212°F.) than when processed at 65°C. (149°F.).

That shrinkage or dimensional changes take place during processing dental acrylic resins has been shown by various investigators including Sweeney,[11] Taylor,[2] Kern,[12] Peyton[13] and Skinner.[14] The shrinkage or dimensional changes during hardening were attributed to polymerization shrinkage or volume changes during curing. Tuckfield, Worner and Guerini[5] also demonstrated the effect of recuring for the purpose of repairing artificial dentures. They demonstrated that with successive curing cycles of 100°C. (212°F.) for one hour periods, the dentures exhibited continued warpage. Stanford, Burns and Paffenbarger[15] in 1955 reported the dimensional changes on repair of artificial dentures when both heat-curing and self-curing denture base repair resins were used. A change of —0.8 per cent occurred in the molar-to-molar dimension of complete upper dentures repaired by heat-curing resins which were boiled during processing. Only —0.3 per cent dimensional change took place, however, if the repairs were heated at 73°C. (163.4°F.) for eight hours.

On the basis of the afore-mentioned studies, the Council on Dental Research recommends the following standard technics: (1) eight hours at 73° ± 1°C. (163.4° ± 1.8°F.) in water or (2) one and one half hours at 73° ± 1°C. (163.4° ± 1.8°F.) and then one half hour in boiling water. The least dimensional change in the denture is obtained by the long time-low temperature cure; that is, eight hours at 73° ± 1°C. (163.4° ± 1.8°F.).

7. Harman, I. M. Effects of time and temperature on polymerization of a methacrylate resin denture base. J.A.D.A. 38:188 Feb. 1949.

8. Caul, H. J., and Schoonover, I. C. A method for determining the extent of polymerization of acrylic resins and its application for dentures. J.A.D.A. 39:1 July 1949.

9. Matthews, E., and Tyldesley, W. R. Polymerization of acrylic denture base materials. Brit. D.J. 89:148 Sept. 19, 1950.

10. Johnson, W., and Matthews, E. Further fatigue studies on some dental resins. Brit. D.J. 92:91 Feb. 19, 1952.

11. Sweeney, W. T. Denture base material: acrylic resins. J.A.D.A. 26:1863 Nov. 1939.

12. Kern, W. R. Possible dimensional changes in denture base materials. J.A.D.A. 28:1952 Dec. 1941.

13. Peyton, F. A., and Mann, W. R. Acrylic and acrylic-styrene resins: their properties in relation to their uses and restorative materials. J.A.D.A. 29:1852 Oct. 1942.

14. Skinner, E. W., and Cooper, E. N. Physical properties of denture resins: Part I. Curing shrinkage and water sorption. J.A.D.A. 30:1845 Dec. 1943.

15. Stanford, J. W.; Burns, C. L., and Paffenbarger, G. C. Self-curing resins for repairing dentures: some physical properties. J.A.D.A. 51:307 Sept. 1955.

COUNCIL ON DENTAL EDUCATION

Dental and dental hygiene students: their characteristics, finances and practice plans VII. Practice location plans of dental students

The total enrollment of dental schools in the United States built up from approximately 7,500 to almost 12,000 students during the 1940's, reflecting the appreciable increase in dental training facilities during that period. Since 1950, the number of students in training has exceeded 12,000 each year. Nearly all of these students were drawn from within the continental United States. Alaska, Hawaii, Puerto Rico and the Virgin Islands have generally contributed a little more than 1 per cent of total enrollment, while a slightly greater fraction has come from Canada and other foreign locations.

In spite of the recent construction of new schools in several states and the expansion of facilities in certain existing schools, the increment in number of available dentists has failed to provide any per capita increase in dental manpower. In fact, the number of graduates has fallen far short of maintaining the national dentist-population ratio at a constant level. Even with the anticipated further increases in the annual number of graduates between 1955 and 1960, the total production will still be insufficient to maintain the present ratio, even though the lowest, and perhaps the least likely estimate of population growth, were to prevail over the period.[4] Population estimates for 1960, prepared by the United States Census Bureau, indicate an accruing deficit of between 580 and 2,123 dentists for the five year period, according to whether the low or the high estimate is used.

The problem of dentist shortages in many areas has been aggravated by the tendency of dentists to concentrate in urban areas. Inequalities have developed over the years which reflect severe disparities in the availability of service, particularly in low income and sparsely populated states. In many areas, the unduly high proportion of dentists in the older age brackets indicates that further problems of dentist procurement will develop because of the proportionately large numbers who may be expected to retire from practice. In planning to meet or prevent future shortages, data must be available concerning age and geographic distributions of dentists in the country. It is also necessary to analyze the relationships which prevail between sources of dental students, the location of the schools which they attend, and the geographic pattern of their plans for establishing dental practice on graduation from dental school.

Earlier studies[5,6] of dentist listings in the 1950 *American Dental Directory* indicate that dentists in the past have tended to establish their practices within the area where they were trained. Com-

This is Chapter 7 of a report of a cooperative study made by the Council on Dental Education of the American Dental Association and the Division of Dental Resources of the United States Public Health Service.

Text of this report was prepared by Walter J. Pelton, D.D.S., M.S.P.H.; Quentin M. Smith, D.D.S.; Elliott H. Pennell; Ruth D. Bothwell, and James N. Ake, Washington, D.C.

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parison of dentist distributions with student distributions by residence at the time they were in dental school further indicates that there is close correlation between the number trained from an area and the count of dentists who subsequently practice in the area. This relationship holds both for states with and without dental schools. The data obtained in the present survey permit investigation of interrelationships between home, school and future practice locations for which data have not previously been available.

NATURE OF THE DATA

The information requested from students in the study group included the location of high school attended and the location envisioned for practicing dentistry. For purposes of this analysis, the state of high school location has been used as equivalent to the "home state" for the student. It is recognized that some students, particularly veterans and older married students, have lived outside of their parental households for some time, have established new homes for themselves, and may actually have become residents of other states. Similarly, the plans for practice are probably tentative for many students. The choice of location will depend on a variety of influences which may or may not have entered into the decision reported. Such factors as new knowledge concerning opportunities for practice, advice from professional contacts made while in school or marriage to a resident of another area may determine the final choice.

Both high school location and planned location for practice were reported by 7,975 of the 10,535 students who participated in the study. For this analysis, the 1953-54 reports obtained from 7,206 students in 39 schools in the initial survey were supplemented in the fall of 1954 by similar data obtained from 769 additional students distributed over the four remaining schools. The tabulations from these reports have been projected to give estimates for the 12,206 students in dental school in 1953-54 whose home locations were within the continental United States. Data obtained from each school were projected to reflect total student counts for the school as of 1953-54.

PRACTICE PLANS AND STATE OF ORIGIN

As would be expected, the great majority of dental students expect to return to their home states for practice. More than 84 per cent of all students planned to do so, and this proportion was approximately the same for students in both public and private schools. The comparable proportion for students from states without schools was somewhat less than the average for all students (79 per cent) but for those from states with one or more schools only slightly greater (85 per cent).

A more detailed analysis indicates that in the study year, 57.8 per cent of all dental students were attending schools in their home states and planned to establish dental practice therein after graduation (Table 43). Another one fourth (26.6 per cent) were attending out-of-state schools but planned to return to their home states to practice. On the other hand, 6.6 per cent were out-of-state students who expected to reside after graduation in the state where the school was located. This, in part, is balanced by 3.9 per cent of all students who attended a school in their home state but expected to practice elsewhere. Finally, the plans of 5.1 per cent of the students were directed toward locations which were neither in their home state nor in the state where the school was located.

As might be anticipated, public schools, as a group, drew proportionately fewer out-of-state students than did private schools. Only one fourth (24.3 per cent) of the students in public schools were out-of-state students, while in private schools

the fraction was nearly one half (46.8 per cent). The proportion of out-of-state students varied widely from school to school. For public schools, this proportion rarely exceeded 40 per cent, and in two thirds of the schools was less than 30 per cent. On the other hand, two thirds of the private schools drew more than 40 per cent of their students from outside the state, and for one third of them the proportion was in excess of 75 per cent. In spite of these differences in sources of students, the extent to which students planned to practice in their home states was high for students in all schools. Approximately 85 per cent of the students in both public and private schools planned to practice in their home states, and rarely was this proportion below 75 per cent for students in any public or private school.

Matriculation at a school within the home state afforded considerable assurance that the services of the future graduate would be available to that state. Sixty-nine per cent of those attending out-of-state schools planned to practice in their home states. Among those whose school was located in the home state, however, the proportion planning to establish practice therein rose to 94 per cent. Although at least part of this difference can be ascribed to the desire of students with strong local attachments to attend schools in the vicinity, the availability of a within-state school is required to nurture such attitudes.

Veterans were less likely than nonveterans to attend dental school in their home states. Approximately 45 per cent of both single and married veterans were from out-of-state, whereas for nonveterans the proportion was but 35 per cent. Also, differences in both veteran and marital status altered the proportions of students planning home state practice.

Table 43 • Percentage distribution of dental students in selected categories by location of home school and future practice: 1953-54

Category of student	All students in school			Future plans for practice						
				In home state			Outside of home state			
							Total	Home and school state		
								Same	Different	
	Total	Home and school state		Total	Home and school state				School and practice state	
		Same	Different		Same	Different			Same	Different
All students	100.0	61.7	38.3	84.4	57.8	26.6	15.6	3.9	6.6	5.1
Type of school										
Public	100.0	75.7	24.3	82.9	70.6	12.3	17.1	5.1	9.1	2.9
Private	100.0	53.2	46.8	85.4	50.0	35.4	14.6	3.2	5.0	6.4
Veteran										
Married	100.0	55.0	45.0	76.0	50.5	25.5	24.0	4.5	12.0	7.5
Single	100.0	56.7	43.3	84.0	53.7	30.3	16.0	3.0	6.8	6.2
Nonveteran										
Married	100.0	65.3	34.7	84.1	60.7	23.4	15.9	4.6	6.7	4.6
Single	100.0	65.4	34.6	89.5	61.9	27.6	10.5	3.5	3.3	3.7
School location										
Northeast	100.0	67.2	32.8	90.5	64.1	26.4	9.5	3.1	2.3	4.1
North Central	100.0	62.1	37.9	82.7	56.1	26.6	17.3	6.0	5.9	5.4
South	100.0	51.8	48.2	83.8	49.3	34.5	16.2	2.5	6.7	7.0
West	100.0	72.3	27.7	79.1	70.3	8.8	20.9	2.0	16.9	2.0

Table 44 • Percentage distribution of dental students, dentists, and civilian population by geographic regions: 1953-54

Distributed totals	Total	Northeast	North Central	South	West
Survey data of dental students					
Home state	100.0	29.4	30.3	24.2	16.1
Practice plans	100.0	27.5	28.1	24.9	19.5
Dental Students Register (1953)					
Residence	100.0	28.3	30.8	24.6	16.3
School location	100.0	22.8	38.8	26.7	11.7
American Dental Directory					
Total dentists (1953)	100.0	34.5	31.7	18.8	15.0
U.S. Census Estimates					
Civilian population (1953)	100.0	25.8	29.3	31.1	13.8

The proportion for married veterans was only 76 per cent; however, at the other extreme, almost 90 per cent of single nonveterans reported such plans. For both single veterans and married nonveterans, the proportion remaining in or returning to their home states to practice was 85 per cent.

REGIONAL COMPARISONS

Rather substantial differences were noted in the practice plans reported by students attending school in the four geographic regions of the country. Schools located in the West, for example, drew nearly three fourths (72.3 per cent) of their students from within the states where the schools are located. In the South, on the other hand, only one half (51.8 per cent) of the students were in this category. The percentages which characterize students in the Northeastern and North Central regions were at intermediate levels.

Students in school in the Northeast, more than in any other region of the country, planned to practice in their home states. In this area, 90.5 per cent of all students had such plans as contrasted with only 79.1 per cent of the students in the West. On the other hand, 16.9 per cent of the students in Western schools were out-of-state students who planned to establish practice in the states where they attended school. In light of the recent large population migration to Western states, it seems likely that this fraction may be unduly elevated by the fact that many of these students may have established residence in this area since graduation from high school. As such, they are not truly out-of-state students even though they are so classified on the basis of the index used in this study.

In order to orient the data obtained from the present study, distributions of students by home state and planned location for practice are contrasted with related data which are available from other sources. The comparative data presented in Table 44 include distributions by residence and by school location for students listed in the 1953-54 *Dental Students Register* and 1953 totals for dentists and for total population. Close agreement in distributions by home state and planned practice location is evident. The proportions of students in school who were drawn from both the Northeastern and North Central regions are about 2 per-

centage points greater than the corresponding fractions for students who plan to practice in those regions. In the South and in the West the pattern is reversed. The favorable balance in the South is very small (0.7 per cent). On the other hand, nearly one fifth (19.5 per cent) of all students in school plan to practice in the West whereas only 16.1 per cent were drawn from states in that region.

The regional distribution of students, as determined by high school location, departs but little from one based on residence. For only one of the four regions was the divergence as much as 1 percentage point. For the Northeast, where the difference was greatest, 29.4 per cent of the students attended high school in the region while 28.3 per cent were classified as residents of the area. For each of the other three regions, the proportion who were residents of the region was slightly in excess of the proportion who attended high school in the region.

The distribution of students by school location diverged substantially from that based on state of origin, whether determined in terms of home state or residence. For states in both the Northeast and the West, the proportionate shares of students in school were considerably greater than the proportions of all dental students who were attending schools located in these regions. In other words, the numbers of students being trained in the Northeast and the West were not commensurate with the contributions of these regions to total dental school enrollment. Only 22.8 per cent of all dental students were attending schools in the Northeast, but 28.3 per cent of all dental students throughout the country were residents of the Northeast, and 29.4 per cent had attended high schools in that region. Similarly, less than 12 per cent of all dental students were attending Western schools, but more than 16 per cent originated in Western states. On the other hand, 38.8 per cent of all students were being trained in the North Central States even though only 30 per cent originated in that region. The same situation prevailed to a lesser degree in the South. Nearly 27 per cent of all dental students were enrolled in Southern schools, but less than 25 per cent were drawn from states in that region.

Some idea of the extent to which states have been successful in procuring dentists in the past is revealed by the geographic distribution of all dentists in contrast with the distribution of population. The data indicate that states in the Northeast have been particularly successful in this respect. In 1953, although having but 26 per cent of the population, these states had 34 per cent of all the dentists in the country. Similarly, in the West, the proportion of the population was 13.8 per cent in contrast with 15.0 per cent of all dentists. Although the difference was small, the North Central states, with 29.3 per cent of the population, had built up their dentist total to 31.7 per cent. Only in the South did the share of dentists fall below the proportion of the population. More than 31 per cent of the population but only 19 per cent of all dentists were in this region.

Comparison of these population and dentist distributions with reported practice plans of students indicates that important changes are taking place in the distribution pattern of dentists. For the Northeast, the share of graduates, while substantially below the current share of all dentists, will still be somewhat in excess of that region's share in the population total. The anticipated acquisition of new graduates by the North Central region is slightly less than its current share of either dentists or population. The South, on the other hand, will receive a substantially greater proportion of dentists soon to enter practice than it has accumulated out of the current dentist total, but this proportion will still be far below its share of the national population. Student plans indicate that in the West, new graduates will be added in propor-

Table 45 • Percentage distribution of dental students attending school in different regions by location of home state and planned location of future practice, by geographic location of school: 1953-54

Geographic location of school	Home state			Planned practice state		
	All students	Same region as school	Different region than school	All students	Same region as school	Different region from school
United States	100.0	82.1	17.9	100.0	82.0	18.0
Northeast	100.0	94.9	5.1	100.0	93.5	6.5
North Central	100.0	75.1	24.9	100.0	71.5	28.5
South	100.0	77.5	22.5	100.0	79.6	20.4
West	100.0	90.1	9.9	100.0	98.9	1.1

tions far beyond that region's share of present dentist and population totals.

The relationship between numbers of students in school from different regions and the extent to which students were drawn from and plan to return to different regions is indicated in Table 45. Of the 12,206 students in school, 82.1 per cent were from states located in the same region as that in which the school was located, and 82.0 per cent plan to practice therein. The close parallel between sources of students and planned location for practice is evident for each region of the country. The patterns vary, however, from region to region. Students in school in the Northeast are drawn largely from states within that region, and in like manner their graduates return to the area. Schools in both the North Central and Southern regions draw substantial numbers of students from outside the region and return like proportions to such outside regions. The pattern in the West is somewhat different. Of its students, approximately 90 per cent come from states in the West and 99 per cent plan to practice there.

The extent to which students, by choice or necessity, matriculate in schools in different regions and the extent to which dentists are drawn from schools in different locations is indicated in Table 46. Of the students in training from states in the Northeast, only 74.6 per cent were in schools in the region, and one fourth had traveled to schools located elsewhere. On the other hand, 78.4 per cent of the students planning to practice in the region were being trained there, and 21.6 per cent were from other school locations. The North Central region provided facilities which accommodated 95 per cent of its own dental students, and practically all

Table 46 • Percentage distribution of dental students with home location and planned practice locations in different regions by school location: 1953-54

Geographic location of home state or planned practice	Home state			Planned practice state		
	All students	School location		All students	School location	
		Same region	Other region		Same region	Other region
United States	100.0	82.1	17.9	100.0	82.0	18.0
Northeast	100.0	74.6	25.4	100.0	78.4	21.6
North Central	100.0	95.1	4.9	100.0	97.7	2.3
South	100.0	85.5	14.5	100.0	85.4	14.6
West	100.0	66.1	33.9	100.0	59.9	40.1

Table 47 • Number of students in training from different regions and the extent to which practice plans of students indicate losses from and additions to the numbers who will practice in the region: 1953-54

Geographic location of home state	Students in training from region	Losses to other regions	Gains from other regions	Total to practice in the region
			Number of students	
United States	12,206	917	917	12,206
Northeast	3,584	279	53	3,358
North Central	3,704	427	153	3,430
South	2,958	165	250	3,043
West	1,960	46	461	2,375
			Per 100 students from region	
United States	100.0	7.5	7.5	100.0
Northeast	100.0	7.8	1.5	93.7
North Central	100.0	11.5	4.1	92.6
South	100.0	5.6	8.9	102.9
West	100.0	2.3	23.5	121.2

students with plans to practice in the region were being trained therein. Similarly, 85.5 per cent of the students from the South were being trained in the South, and an equivalent fraction of those planning to practice in the region were being trained there. Students from states in the West were more likely to be trained elsewhere. More than one third of these were in schools located outside of the region, and 40 per cent of those who planned to practice in the West were attending schools in other regions.

The data in Table 47 have been developed to reveal the interchange that may be expected between home and practice locations. In the gross, only 917 or 7.5 per cent of the 12,206 students in school plan to practice in locations which are outside the region where their home state is located. As has been indicated previously, 84.4 per cent of all students in school expect to remain in or return to their home states, leaving a balance of 8.1 per cent whose practice will involve moving from their home states to other states in the same geographic region. As a result of the interplay between the 7.5 per cent whose practice plans include moving to other regions, the South and the West stand to gain. For the South, the net gain is only 3 per cent. The West, on the other hand, will gain about 21 per cent above the numbers being trained from states in the region. Differences between the number of students trained from the region and those planning to practice therein accrue to net losses in the other two regions. The magnitude of the loss was 6.3 per cent in the Northeast and 7.4 per cent in the North Central region.

CONCLUSION

For the most part, dental students plan to stay in or return to their home states to practice dentistry. Of the 12,206 students in school, 84.4 per cent have such plans. These consist of 57.8 per cent who were attending school in their home states and 26.6 per cent who were in out-of-state schools.

One fourth of the students in public schools and nearly one half of those in private schools were out-of-state students. However, there was essentially no difference in the proportions of students in the two types of schools who planned to practice in their home states.

Attachment to home state, as a practice location, was particularly strong for students attending schools in their home states. Of these, 94 per cent planned to remain for practice.

Veterans show a weaker attachment to their home states than do nonveterans, and married students are less likely to practice in their home states than are single students. With the current decline in the number of veterans in schools, it seems likely that, in the future, plans to practice in an area may be even more directly related to home state locations than was true during the study year.

Plans for practice reported in the survey reflect some tendency toward the development of a more equitable distribution of dentists in relation to population than now prevails. In other words, those regions most generously supplied with dentists are likely to obtain a smaller fraction of the new dentists, whereas those regions whose past acquisition of dentists has been least favorable may expect some improvement in their position.

Inasmuch as nearly 85 per cent of all students plan to practice in their home states, it is not surprising that only 917, or 7.5 per cent of all students in school, plan to move to other regions to practice. Such interchange of locations for even this small number of students effects a net reduction in the numbers planning to practice in the Northeastern and North Central regions equivalent to 6 or 7 per cent of the numbers trained from those areas. These decreases are balanced by a 3 per cent increase in the South and a net expansion of 21 per cent in the West over and above the number that might be expected on the basis of the numbers of students in dental school from these regions.

Observations of Domesticated Animals • I know that scientists generally reject observations based on domesticated animals. Yet it seems to me that man can often draw some particularly profitable lesson from observations of domesticated animals; for however deformed they may be, domesticated animals are closer to human beings than are wild animals, and, besides, man too is domesticated. It might even be interesting to study the effect of that development, and all the deviations of instinct implied by the fact that man no longer has to satisfy his needs primarily. It would be a mistake to assume that domesticated animals are any happier because they too have no longer to satisfy their needs. For in the state of nature, and without man's intervention, any creature incapable of taking care of itself is eliminated, and especially the least resistant. The protection of the puny and sickly, the artificial prolongation of their existence is due to man; and this permits us to state that man, far from having decreased suffering on this earth, everywhere introduced and supported this deviation from natural law, and even with the help (or the excuse) of pity.—*Andre Gide, "The Journals," Alfred A. Knopf, 1956.*

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Editorials

A new record for the Relief Fund

The 1955-56 Relief Fund campaign has shattered all previous records and topped last year's campaign by a substantial amount.[1] As of June 18 $114,887 had been contributed, as against last year's total of $111,273. Forty-four constituent societies and the U. S. Public Health Service had already topped their quotas and some of the remaining fourteen constituent societies had almost attained their pledged amounts, with two weeks yet to go.

The Relief Fund principal, as of December 31, 1955, amounted to $907,145, to which will be added shortly the Association's share of this year's contributions—approximately $57,500. None of the principal sum can be used for relief grants; only the income therefrom can be so used. Such income last year was about $50,000, of which almost $40,000 was disbursed in grants. As the remaining $10,000 easily could have been depleted by making less than half a dozen additional grants, it is obvious that the Relief Fund is working on a narrow margin and that it can meet additional request for aid only with difficulty. Obviously it is essential that the Relief Fund principal be built up to the point at which it can have an assured income sufficient to pay current grants, plus a reserve for a rainy day.

This is the fourth successive year in which the Association has met and passed its national goal of $100,000 in the Relief Fund campaign. Dentists can be proud of this record and of the history and achievements of the Relief Fund, the sole purpose of which is to aid dentists and their families in distress.

Lest members of the Association, however, grow too vainglorious over this record, it must be pointed out that $115,000, from an active membership of 77,000, represents a per capita contribution of about $1.50—not an overly munificent sum to a brother in distress. Let's up the ante next year.

1. News of dentistry. Relief fund contributions near $115,000 in mid-June. J.A.D.A. Page 95 this issue.

William J. Gies, 1872-1956

On May 20, 1956, William J. Gies died at his home in Lancaster, Pa. His death, at the age of 84, has removed from the scene a man whose efforts on behalf of dental education, dental research and dental publications have been monumental. On learning of his passing, THE JOURNAL asked Arthur H. Merritt, life-long friend and associate of Dr. Gies, to write a tribute to him on behalf of American dentistry. Dr. Merritt, president of the William J. Gies Foundation for the Advancement of Dentistry and former president of the American Dental Association writes:

In the death of Dr. William J. Gies the dental profession has suffered an irreparable loss. A man of many talents, unselfish to the point of indifference to personal interests, he served his fellow men with a devotion that knew no limits. This he did with no thought of reward, other than the satisfaction of work well done.

Born in Reisterstown, Pa., February 21, 1872, and a graduate of Gettysburg College (B.S.), 1891, and Yale (Ph.D.), 1897, Dr. Gies served for many years as professor of biological chemistry at Columbia University. In addition to his responsibilities at Columbia, Dr. Gies for nearly half a century gave of himself, his time and his energy, to the advancement of dentistry.

In 1919, among other research projects, he founded the *Journal of Dental Research,* and for 17 years he edited and prepared it for publication without compensation.

In 1920 he organized the International Association for Dental Research, an organization which has had world-wide influence in the promotion of dental research. These research activities of the I.A.D.R., published in the *Journal of Dental Research,* represent 34 volumes of several hundred pages each—a remarkable achievement.

In 1921, under the auspices of the Carnegie Foundation, Dr. Gies engaged in a five year study of dental education in the United States and Canada. During that time he visited and made a study of every dental school in both countries. His report was later published in a volume of 692 pages—an amazing undertaking and one without a parallel in the history of dental education.

In 1923 he initiated the negotiations which led to the organization of the American Association of Dental Schools.

The innumerable contributions which Dr. Gies made to the advancement of dentistry were not unappreciated by the dental profession. Every honor within its province was bestowed on him. He received honorary membership in many of its professional organizations; the Award of Merit of the Rhode Island State Dental Society; the Distinguished Service Award of the American College of Dentists; the Callahan gold medal of the Ohio State Dental Society, and the Spenadel and Burkhart awards. He received honorary degrees from several universities.

More recently, and as an expression of the esteem in which he was held by those closest to him, The William J. Gies Foundation for the Advancement of Dentistry, Inc., was established. More than 600 dentists have contributed to it as a lasting memorial to Dr. William J. Gies, dentistry's most generous benefactor.

From this list of achievements it may be seen that Dr. Gies, although never a dentist, contributed more to dentistry than many who, trained in its basic principles, have spent a lifetime in its practice.

The American Red Cross: seventy-five years

More than 3,700 Red Cross chapters throughout the country have just participated in a nation-wide observance of the seventy-fifth anniversary of the founding of the American National Red Cross. The American Dental Association joins with other national health organizations in paying respects to this most distinguished humanitarian organization. Founded on May 21, 1881, by Clara Barton, the American Red Cross has served through four major wars and more than 6,000 major disasters. It is one of some 68 national Red Cross societies throughout the world, each autonomous and independent within its own jurisdiction.

Originally, the American Red Cross operated as the official disaster relief agency of the United States government. During the Spanish-American War it began to serve members of the Armed Forces—a service and specific responsibilities officially assigned it by Congressional charter in 1900. The charter assigns these responsibilities to Red Cross: "to furnish volunteer aid to the sick and wounded of the Armed Forces in time of war . . . to act in matters of voluntary relief . . . to continue and carry on a system of national and international relief in time of peace and apply the same in mitigating the sufferings caused by pestilence, famine, fire, flood, and other great national calamities, and . . . to devise and carry on measures for preventing the same."

The services of the Red Cross to the military and in civilian war relief work are well known to millions of Americans, including dentists, who served in World Wars I and II and in Korea. More than ten years after the end of World War II, the American Red Cross still is devoting over 40 per cent of its budgeted funds for service to members of the Armed Forces and to veterans.

The nation's need for the Red Cross today is greater than ever. The fiscal year ending June 30, 1956, was the worst disaster year—stated in terms of the numbers of victims aided and the amount of money spent—in all the seventy-five years of Red Cross history. Since July 1955 the organization has spent $27,500,000 (five times the average annual disaster expenditure) to aid victims of floods on the East and West coasts, the Oklahoma-Kansas tornado and other major catastrophes.

Although aid of such magnitude could only be made possible through the voluntary contributions of the American public, the channeling of these contributions efficiently and effectively requires superb managerial ability—an ability in which the American National Red Cross excels—one which has made it the national force that it is today and one which commands and receives the full respect of the American dental profession.

Montana commends Senator Murray

The Montana State Dental Association properly has commended by resolution James E. Murray, United States Senator from that state,[1] for his diligence in introducing and co-sponsoring bills to erect facilities for dental research and for his support of dentistry's petition to appropriate the sum of $5,000,000 to erect these facilities and to further dental research within the National Institutes of Health.

The American Dental Association is glad to join the Montana State Dental Association in expressing appreciation and thanks to Senator Murray for his efforts to obtain passage of this needed legislation. As the fruits of dental research become more readily available, the American people will join the dental profession in commending such stalwarts as Senators Murray and Hill, Representatives Priest (Tenn.) and Long (La.), and the many other informed Congressmen who have supported these bills.

1. News of dentistry. Senator commended for role in aid to research. J.A.D.A. Page 99 this issue.

International Correspondence

NEWS FROM GREAT BRITAIN

Mr. W. Stewart Ross writes that by the time these notes are published, the British Dental Association will have held its 76th Annual Conference at Brighton under the presidency of Mr. R. J. Hooker, who for many years has been chairman of the Council of the Southern Counties Branch of the Association.

For the first time, a public dental health exhibition was arranged for the public and more especially for the children in the district. Poster competitions were held for the children and prizes allotted to the successful contestants. At the same time there was a debate on public dental health by a panel of leading British dentists, and the whole meeting was focused on educating the public in oral hygiene.

The dental health exhibition was officially opened by Miss Hornsby Smith, Parliamentary Secretary of the Ministry of Health, and arrangements were made for groups of school children to be escorted around the exhibition.

For the first time, the British Dental Association had the opportunity of welcoming the president of the American Dental Association, Dr. Kingsbury, who stayed in England after his visit to Zurich where he attended the annual meeting of the Fédération Dentaire Internationale as an official delegate of the American Dental Association. This rare honor of receiving the president of the American Association at the annual session was appreciated by all, and it is hoped that this may mark the beginning of an interchange of distinguished dentists from our two countries to our respective annual meetings.

Among the papers delivered at the British conference was one by Mr. Terence Ward, director of oral surgery at the Maxillo-Facial Centre, East Grinstead. Mr. Ward, an acknowledged expert, spoke on "Split Bone Technique for Lower Thirds."

DENTISTS' ACT

As the result of the passage of the Dentists' Act giving autonomy to the dental profession in Great Britain and Northern Ireland, nominations for the governing council have now been received from a large number of dentists throughout the country, and elections will take place in the near future. The whole profession seems to be taking a lively interest in the forthcoming elections. The interest results, to a great extent, from the fact that one of the duties of the newly elected Council will be to initiate experiments in the use of ancillary workers. The outcome of this experiment may alter the whole structure of dental practice in this country, and it is natural that the profession should take a serious and important interest in electing members to the Council. Edward Samson in the *British Dental Journal* of May 1 writes:

"So colleagues you are now autonomous, independent fellows with control of your own affairs. Self-government; and dentistry for dentists. Maybe you haven't given a thought to what autonomy means for you. Perhaps you don't even realize that this is the status you have so long been shouting for—if it is. Perhaps you don't understand how profoundly our latest of Dentists Acts will change your lives, will give you at least that independence which you have been told you have always wanted.

"Once upon a time, in those bad old days when you were subservient to the medical profession, you chafed against such cruel injustice suffered by a profession of integrity. You surely remember the dejection you felt when you realised that the Dental Board was answerable to the General Medical Council—that is if you knew about it. You have now, after ten years of degrading subjection, been given independence. Your General Dental Council is a symbol of your freedom, your self-governing body, responsible only to itself, and those who elect its minority of elected members. And except for the quite insignificant fact that nineteen of its members will serve on it by nomination and only eleven will be elected by you, it represents your democratic parliament.

"Nor, let me remind you, in case you have miscounted your blessings, is this the only advantage you have gained from our new act. The G.D.C. will be responsible for the education of dental students, if it can find enough of them in the future to educate. I repeat, no longer will dental authority have to defer to the G.M.C. in matters concerning the dentists' education—an affront too long borne by a proud profession. In future, all you fellows by the chairside will have your rightful say in the training of those who are to follow you—well nearly your rightful say. Nineteen academic gentlemen you may not vote into office will also express theirs.

"Dentists are so accustomed to working within a confined area, so limited by the narrow working horizon of the oral cavity, they are apt to become myopic. Now they must endeavour to take the long view, be visionary if they would appreciate those benefits conferred upon them by their new Act. Not only will they become a free, self-governing profession, responsible for the training of their students (or student)—they will at last find time to indulge in those higher flights of their art which have always attracted them. The Act provides for an experiment in training ancillary workers who will do all those jobs dentists loathe—filling, scaling and extracting deciduous teeth, chatting to patients about oral hygiene and how to brush up and down instead of across.

"Well, there it is; you have been crying out for status during twenty years, and now you have it. You are free, self-governing dental surgeons, so let us hear no more of that nagging inferiority complex. Everyone of us is now a dental surgeon in his own right, unless some one spoils it all by pressing for the title of 'doctor.'"

FLUORIDATION

The propriety of the British Dental Association's giving its support to an investigation on the efficiency of fluoridation of public water supplies for the prevention of dental caries has been subject to some criticism. The Association, to foster interest in the scheme which in the United States has been shown to control caries, has built up a panel of speakers to speak to branch sections of the Association throughout Great Britain.

Fluoridation of public water supplies has also been spoken of in approving terms by no less an authority than the eminent Sir Henry Cohen.

ITEMS OF INTEREST

Sir Winston Churchill paid a visit to the Royal College of Surgeons of England April 23 to sign the Roll and to be formally admitted as an Honorary Fellow by the president, Sir Harry Platt, in the presence of Lady Churchill and past presidents of the College.

It is reported that the University College Hospital Dental School, which can take an annual entry of 25 new students, has been receiving applications at the rate of 120 a month. It was further stated that "at this rate, assuming all the applicants were suitable, every dental school in the United Kingdom could be filled more than twice over a year." This is a very different picture from that existing as short a time ago as a year, and one wonders what the McNair Committee, appointed by the government to consider the manpower problem, will produce in its report on this situation.

The dental profession is already being circularized by the travel agencies for the Twelfth International Dental Congress to be held September 7-14, 1957, in Rome. A big contingent from Great Britain is planning to be in Rome next year.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

One of the distinctions of the 84th Congress, which is now drawing near the end of its two year tenure, is that it enacted more laws relating to health than any of its predecessors.

The importance of dental health received its share of recognition, giving indication that this subject will continue to merit serious attention on Capitol Hill in the future. Congressional appropriations for support of dental research reached a new high. Definite progress was made toward construction of a suitable building to house the National Institute of Dental Research at suburban Bethesda, Md. A new law provides for periodic national surveys of illness and disability, including conditions that are wholly or in part of dental origin.

Congress granted pay increases and certain other career benefits to medical and dental officers of the Army, Navy, Marine Corps and the U. S. Public Health Service. It was regarded as certain that the House also would approve, before adjournment, a bill, already passed by the Senate, authorizing erection of a new building for the National Library of Medicine. Now known as the Armed Forces Medical Library, it possesses what is probably the world's greatest collection of dental literature.

At this writing, House approval also was expected to be given a bill—previously passed by the Senate—to aid professional schools, hospitals and other nonprofit institutions engaged in medical and dental research. This program provides for matching federal grants for construction, expansion and improvement of laboratories and other physical facilities.

It is not improbable that the closing weeks of this session of Congress may witness enactment of a bill which gives health insurance benefits to more than two million federal employees and to approximately the same number of dependents. Although dental care probably will not be included among services offered, at the outset, the way would be left open to introduce such benefits at a later time.

A somewhat similar situation prevails with regard to the program, authorized by Congress and implementation of which is now being planned, of government-paid health insurance coverage for dependents of military personnel. Dental treatment is not to be provided, except where it is an adjunct of medical or surgical care. However, government officials do not rule out the possibility that this benefit may be added later, particularly if the basic program's cost does not exceed expectations after a year's experience. It is scheduled to get under way around the first of next year.

FUNDS FOR RESEARCH FACILITIES

Sentiment is so strong on Capitol Hill for providing subsidies to medical and dental schools requiring larger and more modern classroom facilities, as a means of promoting the output of more physicians and dentists, it is virtually certain that enabling legislation would have been enacted this year if the racial segregation issue had not become so intense. Seasoned observers hold no doubt that legislation to this end will be reintroduced in 1957, and probably passed.

Norman Buckman, a U. S. Public Health Service dental officer assigned to the Navajo medical center at Fort Defiance, Ariz., has won a rare distinction. At the recent annual meeting of the U. S. Public Health Service Clinical Society at Bethesda, Md., his paper, "Premedication in Children's Dentistry," won first prize. It was the first time that a top award of this group had gone to a dentist.

The Buckman paper was a report on a two year clinical research project in which Indian children were the subjects.

He is a native of Philadelphia and a graduate in dentistry of the University of Kansas City. Dr. Buckman entered the U. S. Public Health Service in July, 1953, and interned at the USPHS hospital in Staten Island, N. Y.

HEALTH ADVISORY BOARD

An Interagency Health Advisory Board has been created to aid Arthur S. Flemming, director of the Office of Defense Mobilization, in emergency planning. As chairman, Flemming appointed Howard A. Rusk, M.D., who will continue to serve as chairman of ODM's Health Resources Advisory Committee.

The following federal departments and bureaus will name representatives to the board: Defense; Army; Navy; Air Force; Health, Education and Welfare; Veterans Administration; Federal Civil Defense Administration.

The Internal Revenue Service has published a ruling that alcohol used by dentists in their offices comes under heading of "industrial use," for tax purposes. The ruling issued by the Internal Revenue Service reads, in part, as follows:

"Section 182.486 of the Industrial Alcohol Regulations lists the purposes for which alcohol may be disposed of in bulk . . . as permitted by the Regulations relating to Bulk Sales and Bottling of Distilled Spirits, issued under the Federal Alcohol Administration Act. . . . *Held*, the use of alcohol by doctors and dentists for such purposes as compounding, sterilization, antisepsis, etc., comes within the classification of 'industrial use' provided in section 182.486."

Association Affairs

FILE BRIEF WITH FTC ON LABORATORY INDUSTRY CODE

The American Dental Association in June filed with the Federal Trade Commission a brief in support of organized dentistry's petition for amendment or revocation of the FTC's Trade Practice Rules for the Commercial Dental Laboratory Industry.

The brief objected to the FTC's Rules on the grounds that the Rules improperly describe the relation between the dental profession and the industry as already established in state dental practice acts and that the government agency had failed to include the mail order denture firms within its regulations.

Specifically, the Association's brief pointed out that the "design" of dentures is the responsibility, not of the laboratory, but of the dentist. The laboratory should fabricate and process dentures, the brief asserted, only on authorization from the dentist and only from impressions, casts or models furnished by him. The Rules now indicate that a laboratory fabricates or processes dental appliances on the basis of either an authorization or a cast or model.

The Association's brief urged also the inclusion of a rule which would prevent laboratories from soliciting business from the general public.

THIRTY SOCIETIES TAKE PART IN SECRETARIES' CONFERENCE

A checklist against which a state society might measure its effectiveness was provided participants in the Eighth State Secretaries' Conference held June 4-6 in the newly remodeled board room of the Central Office. The meeting was attended by representatives of 30 societies.

The criteria for evaluating society effectiveness were presented in a paper prepared by Harold Hillenbrand, Association secretary, from results of questionnaires on society practices sent to the state groups. The paper was given by R. H. Sullens, assistant secretary, Council on Dental Education, as Dr. Hillenbrand was in Europe for the FDI meeting.

Among suggested yardsticks were the ability of the society to collect dues on time, the percentage of dentists in the state who are members, the adequacy of financial reserves and the existence of certain programs such as accreditation of dental laboratories and hospitals, education activities, insurance plans and dental health projects. Attendance at annual sessions and the existence of a publications program, Dr. Hillenbrand's paper suggested, are also important measures as these are the two means of communication with members.

Proper procedure in the handling of questions relating to professional ethics was outlined by Bernard J. Conway, secretary of the Council on Legislation. The right of an accused individual to adequate hearing, defense and appeal must be protected, Mr. Conway said. A proper procedure "can be accomplished partly through effective bylaws," he pointed out, and bylaws of the components and constituents must be consistent with each other and with those of the American Dental Association.

Later during the conference, participants debated the value of grievance committees as a method of handling grievances from patients. Other topics discussed were insurance programs, organization and aims of component officer and regional conferences and the components of an effective program of hospital dental service.

The next secretaries' conference will be held June 10-12 of next year. Copies of the conference report will be available in mid-July, reports Louis M. Cruttenden, Association assistant secretary.

MEMBERSHIP SOARS TO RECORD HIGH AT MAY 31 TALLY

Total membership in the American Dental Association reached 84,931 on May 31 to set an all-time high. The new total was 80 above the year-end mark of 1955 and was nearly 1,700 ahead of the figure of May 31 a year ago. Forty-six constituent societies reported membership gains during the year.

EDUCATION COUNCIL ACCREDITS CANADIAN SCHOOLS

The American Dental Association's Council on Dental Education voted unanimously late in May to give full recognition to the five dental schools of Canada. The Council's action marked the first time that the dental schools of another country have been placed on the Council's accreditation list, announced Bert L. Hooper, Council chairman.

The Canadian Dental Association began its own accreditation program recently. For the past five years the United States organization has been working with its Canadian counterpart in setting up an accreditation program. The Canadian plan uses the same standards as does the American Dental Association.

For several years, the Canadian group has awarded recognition to schools in the United States after they secured accreditation from the A.D.A.

Canadian schools accredited in May were: Faculty of Dentistry, University of Toronto; Faculty of Dentistry, University of Alberta; Faculty of Dentistry, McGill University; Faculté de Chirurgie Dentaire, Université de Montreal, and Faculty of Dentistry, Dalhousie University.

EXTENSIVE STUDIES PLANNED ON DENTAL PRACTICE

Two extensive studies, one on dental practice and one on group practice, will be undertaken by the Council on Dental Health, announces R. F. D. Johnson, Council chairman. The Council met in Chicago May 17 and 18, following the Seventh National Dental Health Conference.

The first study will compile information on the desirable layout for the dental office and its equipment, efficient staffing and effective practice management. It is designed to be of use to the recent graduate developing his office, to communities interested in attracting dentists and to financial agencies which extend credit to dentists for office development.

The second project will gather information on various group dental health practice arrangements such as open and closed panels for the purpose of developing standards for their proper operation.

The Council approved also the preparation of a manual on agencies of dental societies concerned with dental health care. Members of the Council named J. H. Eshleman of Philadelphia Council vice-chairman.

DATES ANNOUNCED FOR 1957 DENTAL APTITUDE TESTS

The dental aptitude tests of the Division of Educational Measurements of the Council on Dental Education will be given to applicants for the 1957 freshman classes October 5 and 6, 1956; January 18 and 19, 1957, and April 26 and 27, 1957. The tests will be given at 46 dental schools and 49 other testing centers, according to Mrs. Grace Parkin, Division director.

In the current testing year, some 5,900 persons were tested, an increase of about 300 over the number from the preceding period.

Eugene Ormandy conducts the famed Philadelphia Orchestra in a concert following the American Dental Association's General Meeting, Tuesday, October 2, at the Warner Theatre in Atlantic City, N. J.

DELEGATES TO HEAR ORMANDY AND PHILADELPHIA ORCHESTRA

Eugene Ormandy conducts the famed Philadelphia Orchestra in a concert following the American Dental Association's General Meeting, Tuesday, October 2, at the Warner Theatre in Atlantic City, N. J.

The distinguished conductor, son of a Budapest dentist, began his musical career on the violin. At the age of five he was admitted to the Royal Academy, the youngest pupil the Academy had ever had. At 17 he received his professor's diploma and began teaching at the State Conservatory in Budapest.

Ormandy toured central Europe and in 1921 was invited to the United States. His first recognition was as one of radio's earliest important conductors. By 1930, his name was found on the roster of guest conductors with such great names as Toscanini, Beecham and Stravinsky.

In the early 1930s, Ormandy conducted the Minneapolis Symphony. In 1936, he joined the Philadelphia Orchestra then under the direction of Stokowski.

The orchestra, already one of the world's major orchestras, continued its impressive career. Among the first to televise a concert, it made musical history also in the film world. It appeared in "The Big Broadcast of 1937," and in "One Hundred Men and a Girl." Several years later, it played the score for Walt Disney's experimental film "Fantasia." One of the first to record classical music when it recorded Brahm's Fifth and Sixth Hungarian Dances in 1917, the orchestra has today what is considered one of the most impressive recorded repertoires.

Last summer, the Philadelphia Orchestra took part in the world-inclusive cultural exhibition, Salute de France. It was hailed throughout Europe where it held 24 concerts in 17 cities of Western Europe.

At Atlantic City, Eugene Ormandy conducts the Philadelphia Orchestra in Berlioz' overture "The Roman Carnival," Beethoven's Symphony No. 5 in C Minor, Op. 67, Strauss' tone poem "Death and Transfiguration," and Ravel's Suite No. 2 from the ballet "Daphnis and Chloe."

COUNCILS, DELEGATES TO MEET IN ATLANTIC CITY

The various agencies of the Association and the delegates from the trustee districts will hold meetings at the time of the Association's annual session in Atlantic City, N. J., October 1-4. The Councils on Dental Trade and Laboratory Relations, Legislation and Relief will provide consultation service to interested persons at the Auditorium on Monday, October 1. The State Officers' Conference, which

will be held Sunday morning, September 30, and which closes with a luncheon, will be at Haddon Hall.

Among other meetings scheduled for this headquarters hotel are those of the trustee districts, the past presidents' luncheon, Wednesday, October 3, in the Bakewell Room, and the luncheon for international guests, Tuesday, October 2, in the Benjamin West Room.

The Board of Trustees meets in the Mandarin Room on the Tower Floor of Haddon Hall; the House of Delegates, in Atlantic City's Auditorium, second floor. The general meeting is at the Warner Theatre, Tuesday night, October 2. A breakfast for section officers and members of the Council on Scientific Session will be held by the Council Sunday, September 30, at the Claridge Hotel.

In addition, some 30 organizations in the dental field will meet prior to the annual session.

DENTAL GOLFERS TO TEE OFF OCTOBER 1 IN NEW JERSEY

The next golf tournament of the American Dental Golf Association will be held at Seaview Country Club, Absecon, N. J., October 1, according to W. F. Andes, president. Members in good standing of the American Dental Association are eligible to membership in the golf group. Those desiring to play in this year's tournament should bring their current handicap verification, Dr. Andes states.

Headquarters for the Golf Association during the annual session will be the Traymore Hotel.

The rolling chair, a wicker wagon first used in the 1880's, is a familiar sight on the boardwalk in Atlantic City, N. J. The American Dental Association will hold its 97th annual session in the famed seaside resort Oct. 1-4.

MEETINGS IN ATLANTIC CITY

American Academy of the History of Dentistry	September 28	Chalfonte
American Academy of Oral Roentgenology	September 28-29	Marlborough-Blenheim
American Academy of Periodontology	September 27-29	Claridge
American Association of Dental Examiners	September 28-29	Haddon Hall
American Association of Dental Editors	September 29	Haddon Hall
American Association of Dental Schools	September 30	Claridge
American Association of Public Health Dentists	September 30	Dennis
American College of Dentists	September 30	Chalfonte-Haddon Hall
American Dental Assistants Association	September 30-October 4	Shelburne
American Dental Hygienists' Association	October 1-4	Dennis
American Dental Society of Anesthesiology	September 29-30	Ambassador
American Denture Society	September 28-29	Traymore
American Society of Dentistry for Children	September 28-30	Ambassador
Association of American Women Dentists	September 30-October 1	Claridge
Georgetown Dental Alumni Association	October 2 (luncheon)	Chalfonte-Haddon Hall
International Academy of Oral Diagnosis	September 30	Claridge
International College of Dentists	September 28-October 1	Haddon Hall
Loyola University Chicago Dental Alumni Association	October 2 (breakfast)	Traymore
Marquette University Dental Alumni Association	October 2 (luncheon)	Dennis
National Alumni Association of the Baltimore College of Dental Surgery	October 2 (breakfast)	Traymore
National Association of Dental Laboratories	October 1-4	Claridge
National Association of Seventh-Day Adventist Dentists	September 27-30	Dennis
Northwestern University Dental School Alumni Association	October 3 (luncheon)	Claridge
University of Illinois Telephone Extension Program	October 2 (breakfast)	Claridge
Alpha Omega	October 1 (banquet)	Shelburne
Delta Sigma Delta	September 28-October 1	Marlborough-Blenheim
Psi Omega	October 1	Ambassador
Sigma Epsilon Delta	October 3	Traymore
Xi Psi Phi	October 1	Traymore

BOOKLET, SLIDES AVAILABLE ON PERIODONTAL DISEASE

A 12 page illustrated booklet on periodontal disease designed for the adult patient has been published by the Bureau of Dental Health Education. A slide lecture on the subject may also be obtained from the Association. The booklet, *They're Your Teeth . . . How Long Will You Keep Them?*, points out that periodontal disease is the greatest cause of tooth loss after age 35 and describes the causative factors, treatment and preventive measures. The booklet provides a list of warning symptoms that should lead the patient to consult his dentist. The text has been approved by the American Academy of Periodontology.

They're Your Teeth may be obtained from the Order Department at the Central Office at the following prices: 25 copies, $2.20; 50 copies, $3.80; 100 copies, $6.25; 500 copies, $29.70, and 1,000 copies, $56.25.

The slide lecture, *Do It Yourself*, emphasizes the patient's responsibility in prevention and control of periodontal disease. It was produced by Capt. Charles T. Pridgeon, (DC) USN, for the Bureau of Medicine and Surgery and consists of

29 slides showing periodontal structures affected by the various stages of periodontal disease. It is especially suitable for patient education but may be used for professional groups as well. The series may be rented from the Association's Film Library for $1.50. Single slides may be purchased from the Order Department at 55 cents for black and white, $1 for color.

DENTAL HEALTH PAMPHLET PUBLISHED AS TEACHER AID

Teaching Dental Health, a colorful and easy-to-read booklet, is among the first three booklets in a series being published for teachers by the American Association for Health, Physical Education and Recreation. The dental health pamphlet was written by Perry Sandell, director of the American Dental Association's Bureau of Dental Health Education.

Divided into three parts, the booklet tells what teachers should know about dental health, how to teach dental health in grades one to six and where to find further resource material.

The booklet may be obtained from the American Dental Association's Order Department at the following prices: single copy, 75 cents; two to nine copies, 65 cents; ten copies, $6; 25 copies, $14; 50 copies, $26; 100 copies, $47.

Others in the series are *Outdoor Education* and *Classroom Activities.*

GEORGE DENTON NAMED TO CHICAGO FACULTY

George B. Denton, research consultant of the American Dental Association's Bureau of Library and Indexing Service, has been awarded the honorary appointment of Professorial Lecturer in Historical Odontology at Zoller Memorial Clinic, University of Chicago. The appointment was announced by Frank J. Orland, clinic director.

Isamu Nakazawa (left), professor of denture prosthesis at the Tokyo Medical and Dental University in Tokyo, discusses American dental education with Shailer Peterson (center), secretary of the Council on Dental Education, and Donald Washburn, director of the Bureau of Library and Indexing Service, during a recent visit to the Central Office. Dr. Nakazawa is visiting the various dental schools across the country.

Dr. Denton has served on the Association's staff since 1949. Formerly, he was professor of dental history and literature at Northwestern University Dental School.

RELIEF FUND CONTRIBUTIONS NEAR $115,000 IN MID-JUNE

Contributions to the 1955-1956 Relief Fund campaign reached $114,887.78 on June 18 as the drive neared completion. With two weeks left in the current campaign, the total had climbed more than $3,600 over the previous high set at the end of the 1954-55 campaign. As of May 29, the last date for which a breakdown was available, only nine societies had failed to reach the 90 per cent mark.

RESEARCHERS FROM OTHER COUNTRIES VISIT NBS

Visitors from places as widely separated as Japan and Germany are among those who have recently visited the dental re-

search section at the National Bureau of Standards in Washington, D.C.

Researchers from abroad included: Prof. Gen. Minoguchi of Kyoto University, Kyoto, Japan; Fumio Watanabe, commandant, Japanese Army Medical School; Yoshio Watanabe, Okayama University Medical School, Japan; J. Pätzold and Werner Güttner of Germany, and Vithal N. Bhatavadekar, University of Bombay, India.

Other visitors were: George A. Lammie of Edinburgh, Scotland; David E. Ince of Birmingham, England; Julies Michmann of Jerusalem; Helge Berggren of Stockholm; Kurt Bessermann Nielsen of Denmark, and B. Combée of Eindhoven, Netherlands. Also visiting were Sydney Blackman of London and Ino Scaiky, organizing dean of the dental school in Jerusalem.

ORAL REHABILITATION GROUP DONATES PACKAGE LIBRARY

A package library containing a bibliography and collection of reprints of material published during the last ten years on dental care of handicapped children has been donated to the Bureau of Library and Indexing Service of the American Dental Association. The donor is the Academy for Oral Rehabilitation of Handicapped Persons. The Academy will keep the package library up-to-date by contributing additional material as articles are published.

Elected officers of the group at its February 5 meeting in Chicago were M. Michael Cohen of Boston, president; Hugh M. Kopel of Detroit, president-elect, and Max L. Bramer of Wheaton, Ill., secretary-treasurer.

Legislation

RECORD SUMS FOR RESEARCH AWAIT COMMITTEE ACTION

A six million dollar appropriation for the dental health activities of the U. S. Public Health Service was awaiting action of a House-Senate conference committee in mid-June, following passage by the Senate of a record budget for the Department of Health, Education and Welfare.

The appropriation of $6,026,000, which included $3,855,000 for research grants, was the full amount requested by the American Dental Association. Earlier, on March 5, the House approved a smaller amount, $3,471,000, of which $1,300,000 would be spent for research grants. The difference will be adjusted by the conference committee.

The increase proposed by the Senate for dental research is nearly three times as much as the current dental research budget. The total budget proposed by the Senate for all types of research at the Institutes is 80 per cent more than the current budget.

N.I.D.R. Building • Now in the House Rules Committee, awaiting scheduling for House consideration, is a measure authorizing four million dollars for construction of a building for the National Institute of Dental Research. The four million dollars was recommended by the House Committee on Interstate and Foreign Commerce. The measure has already passed the Senate with five million dollars authorized.

S. 849 • A second health measure awaiting clearance from the House Rules Committee is S. 849, a bill to provide 90 million dollars in grants on a matching basis over three years to nonprofit institutions such as dental and medical schools to defray the cost of constructing and equipping research facilities.

As approved by the House Committee on Interstate and Foreign Commerce,

the bill is considerably broadened over the Senate version. The House measure drops specific mention of crippling and killing diseases enumerated in the Senate bill; grants may be provided for research "in the sciences relating to health," which is defined to include dentistry, medicine, osteopathy, public health and "fundamental and applied sciences when related thereto."

In addition, a national advisory council of 12 members is set up, eight to be selected from among "leading medical, dental or scientific authorities." The bill as it now stands makes clear that grants are available for dental research construction, a provision which is in line with suggestions made by the American Dental Association during its testimony some months ago.

Other Actions • Other measures of interest to dentistry moving toward enactment in June were the establishment of a National Medical Library and the expanded Old Age and Survivors' Insurance. The OASI measure, including dentists in coverage, has been approved by the Senate Finance Committee and awaits action by the full Senate. Expanded coverage was approved by the House at the last session of Congress.

The National Medical Library bill was passed by the Senate June 11 and has been approved by a subcommittee in the House. The Senate-passed measure provides that the library shall be under U. S. Public Health Service supervision, managed by a 17 member board of regents. The board is to be chosen from the fields of civic affairs, library administration and the health sciences. Dental representation is specifically provided for in the measure. Construction of the building is expected to cost 7 million dollars.

Early in June, the president signed the health care bill for dependents of military personnel. The bill, which provides for civilian medical and hospital services for dependents, limits dental care largely to emergency treatment. Exception is made in overseas areas or in "remote" sections of the United States.

Dental Societies

FOUR DAY CELEBRATION MARKS NORTH CAROLINA CENTENNIAL

"The past is just the beginning" was the theme of the Centennial Meeting of the North Carolina Dental Society held May 13-16 at the Carolina Hotel in Pinehurst, N. C. The four day celebration attracted a registration of over 1,400. The North Carolina Dental Auxiliary, the dental hygienists and dental assistants met in conjunction with the dental society.

Highlighting the centennial activities were addresses by Bernerd C. Kingsbury, president of the American Dental Association; Lon W. Morrey, Association editor, and William N. Hodgkin of Warrenton, Va., treasurer of the American College of Dentists.

Essayists for the meeting included Hugh T. McKinnon, Jr., of Troy, Ala.; Jerome M. Schweitzer of New York and M. Jules King, C.P.A., St. Louis. A popular event was a four man panel on special problems facing members of the profession. Panelists were Edward S. Orgain, M.D., professor of medicine; Leslie B. Hohman, M.D., psychiatrist, and Leonard Goldner, M.D., orthopedic surgeon, all staff members of the Duke University School of Medicine. Norman Ross of Durham, N. C., served as moderator.

J. Walton Branham of Raleigh, president of the North Carolina Dental Society, presided at the meetings of the General Session and the House of Delegates. W. Howard Branch and Penn

Stove pipe hats, frock coats, hoop skirts and sun bonnets of the 1856 era lent color to the North Carolina Dental Society's centennial celebration. Horses and carriages were available for leisurely rides through the pines and for the brave at heart, velocipedes were provided.

Marshall of Raleigh served as cochairmen of the convention committee.

Frank O. Alford of Charlotte and J. Martin Fleming of Raleigh were cochairmen of the centennial committee. Pearce Roberts, Jr., of Asheville, was program committee chairman and E. D. Baker of Raleigh headed the entertainment committee. Other committee chairmen included: E. A. Pearson, Jr., Raleigh, exhibits; C. C. Diercks, Morganton, clinics; Ralph L. Falls, Morganton, publicity; Henry Ligon, Raleigh, entertainment of out-of-state visitors; Thomas G. Collins, Raleigh, superintendent of clinics; M. E. Walker, Durham, golf; Robert Finch, Raleigh, housing; T. E. Sikes, Greensboro, monitor, and Luther H. Butler, Greensboro, clinic board of censors.

Officers elected for 1956-57 were: president, Horace K. Thompson of Wilmington; vice-president, W. B. Sherrod, Winston-Salem; president-elect, Ralph D. Coffey, Morganton; secretary-treasurer, Luther H. Butler, Greensboro. Frank Atwater of Greensboro was reappointed editor-publisher.

Harry Lyons of Richmond, Va., president-elect of the American Dental Association and dean of the School of Dentistry, Medical College of Virginia, and Howard B. Higgins of Spartanburg, S. C., Trustee of the Fifth District, attended.

The North Carolina Dental Society was organized in Raleigh in October of 1856. Its membership was limited to the graduate alumni of dental colleges residing in North Carolina and was said to have been the only such society in the country placing that restriction on its membership.

MISSISSIPPI GROUPS SPONSOR DRUGS IN DENTISTRY FORUM

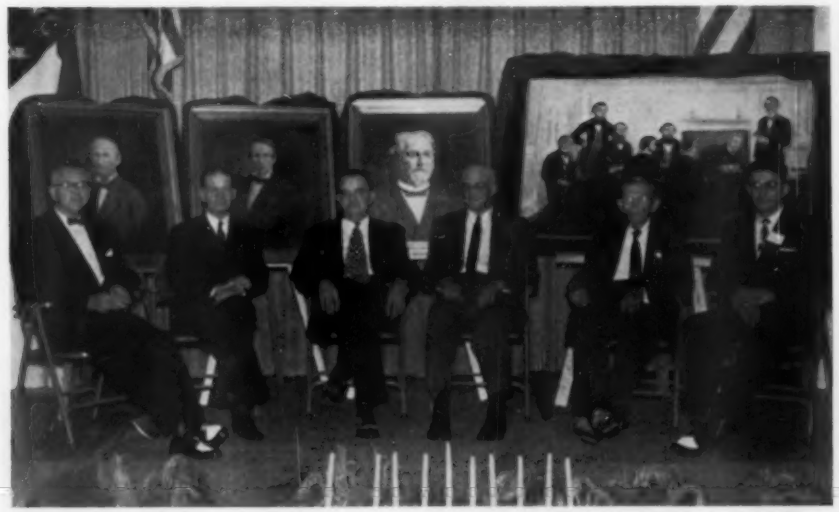
A conference on drugs in dentistry will be held at the University of Mississippi August 30 and 31 under the sponsorship of the school, the Mississippi Dental Association, the Northeast Mississippi Dental Society and the State Board of Health. The school is in the town of University.

Lester W. Burket, chairman of the American Dental Association's Council on Dental Therapeutics and dean of the School of Dentistry, University of Pennsylvania, is a featured speaker. Panelists in a discussion at the close of the conference include Dr. Burket, moderator; John E. Buhler, dean of the School of Dentistry, Emory University; James T. Ginn, dean, School of Dentistry, University of Tennessee; William J. Hanratty, School of Dentistry, University of Detroit; Rutledge W. Howard, Lederle Laboratories, and Irving G. Nathanson of Boston.

Other panelists are: Floyd D. Ostrander, professor of therapeutics and endodontics, University of Michigan; W. Lewis Nobles, School of Pharmacy, University of Mississippi, and Robert E. Stone, Hillman Hospital, Birmingham, Ala.

SENATOR COMMENDED FOR ROLE IN AID TO RESEARCH

Sen. James E. Murray (D., Mont.) has been commended by the Montana State Dental Association for his support of dental research. The Senator introduced and cosponsored a bill to appropriate five million dollars for the construction of a building for the National Institute of Dental Research. He has been an ardent



Portraits of three of the charter members of the 100 year old North Carolina Dental Society were unveiled in ceremonies at the centennial May 13. Portraits (l. to r.) show William F. Beson, Ezra H. Andrews and B. F. Arrington. Seated in front of their predecessors of a century ago are (l. to r.): H. Royster Chamblee, Neal Sheffield, Frank Alford, William N. Hodgkin, J. Martin Fleming and D. L. Pridgen.

supporter of health measures for many years. A resolution passed by the Montana society at its 53rd annual meeting May 4 expressed the membership's "sincere and heartfelt thanks" to the Senator.

C. S. RENOUARD TO BE FETED BY MONTANA SOCIETY

C. S. Renouard, Trustee for the American Dental Association's Eleventh District, will be honored at a testimonial dinner July 14. The event is sponsored by the Third District Society of Montana. Among the guests will be Harold Hillenbrand, Association secretary.

Co-chairmen of the event are Stephan F. Jones and Edward Bartoletti. Among committee members are J. John Kaparich, M. F. Ehrlich, Harry Farrell, Paul Boyden, S. M. Rafish and V. J. Quinn.

C. S. Renouard

ILLINOIS SOCIETY TO HONOR L. H. JACOB, RETIRING TRUSTEE

L. H. Jacob, retiring Trustee of the American Dental Association's Eighth District, will be honored by the Illinois State Dental Society at a testimonial dinner August 11. The banquet will be at the La Salle Hotel in Chicago. A reception will precede the dinner.

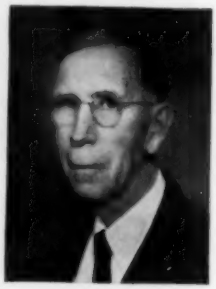
Among speakers who will honor Dr. Jacob are Clarke E. Chamberlain of Peoria, Robert McNulty, dean of Southern California Dental school, and Harold Hillenbrand, secretary of the American Dental Association. Harold Oppice, a former Association president, is toastmaster. Robert J. Pollack is chairman of the testimonial committee.

Dinner reservations are $10 and may be obtained from Paul W. Clopper, secretary of the Illinois State Dental Society, 632 Jefferson Bldg., Peoria 2, Ill.

L. H. Jacob

CARL BURRELL, LONG-TIME SOCIETY SECRETARY, RESIGNS

Carl H. Burrell has resigned as secretary of the Greene County (Ind.) Dental Society after 39 years of continuous service in that capacity. The *Journal of the Indiana State Dental Association* reports that Dr. Burrell probably holds the record for the longest term of office as a society secretary in the 99 years in which the Indiana State Dental Association has been in existence. Dr. Burrell has resigned because of ill health.



Carl Burrell

Cecil P. Jarrell (left) of Monroe, La., and Monroe L. Jarrell of Chattanooga, Tenn., (right), brothers, have been elected president-elect of the Louisiana State Dental Society and the Tennessee State Dental Association, respectively. Both men are graduates of Vanderbilt University School of Dentistry. Both have been active in state dental society affairs for many years.

Dental Education

HYGIENISTS INITIATE PILOT APTITUDE TESTING PROGRAM

Some 1,500 students from 29 of the 33 dental hygiene schools took a battery of aptitude tests in May as part of an experimental program being conducted by the American Dental Hygienists' Association with the guidance of the American Dental Association's Council on Dental Education.

Purpose of the pilot program is to determine whether a nationwide aptitude testing program for applicants to dental hygiene schools is feasible or needed by the schools. Another series of tests will be given in the fall.

DEAN BARALT TO HEAD NEW PUERTO RICAN DENTAL SCHOOL

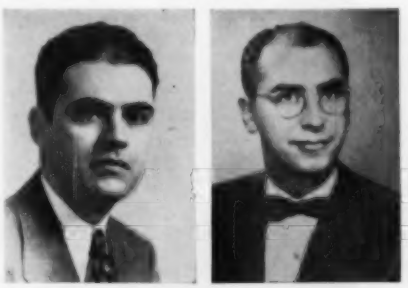
A. Raymond Baralt, Jr., dean for the past six years at Loyola (Chicago) University's dental school, has resigned his post to establish a dental school in Puerto Rico. Dean Baralt will be the school's first dean and will have the task of developing a faculty and implementing a program. The new school is to be established in association with an already existing medical school in San Juan, the capital, as part of the University of Puerto Rico. The first freshmen classes are scheduled for September 1957.

Gustav W. Rapp, Ph.D., has been named acting dean to succeed Dr. Baralt at Loyola. An internationally known dental research scientist, Dr. Rapp is professor of biochemistry and physiology at the dental school. His appointment is effective September 1.

Before coming to Loyola six years ago, Dr. Baralt was associate professor of crown and bridge and secretary of the faculty at the School of Dentistry, Temple University. He received his dental degree from Temple in 1942.

During his administration a graduate division was established in the dental school, and a strong alumni organization was developed.

Dr. Baralt, son of a dentist, was born in Puerto Rico.



Dean Baralt G. W. Rapp

PAUL E. BOYLE NAMED DENTAL DEAN AT WESTERN RESERVE

Paul E. Boyle, internationally known dental educator, researcher and writer, has been named dean of the School of Dentistry at Western Reserve University in Cleveland. The new dean goes to Western Reserve from the University of Pennsylvania, where he has been professor and chairman of the department of oral histology and pathology.

Dr. Boyle succeeds William L. Wylie, who retires July 1 after 19 years as head of Western Reserve's dental school. Dr. Boyle's appointment becomes effective September 1.

Dr. Boyle received his dental degree from the Harvard School of Dental Medicine. He served on the Harvard faculty and had a private practice in the Boston area for nearly 20 years. In addition to his position at Pennsylvania, Dr. Boyle is chief of the section on oral pathology of the dental department at Philadelphia General Hospital.

Paul E. Boyle

William L. Wylie

In 1952 he was consultant on dental education for the government's Mutual Security Agency, assigned to the Union of Burma. Dr. Boyle is on the board of editors of the *Journal of Dental Research* and is consultant to the American Dental Association's Council on Dental Health.

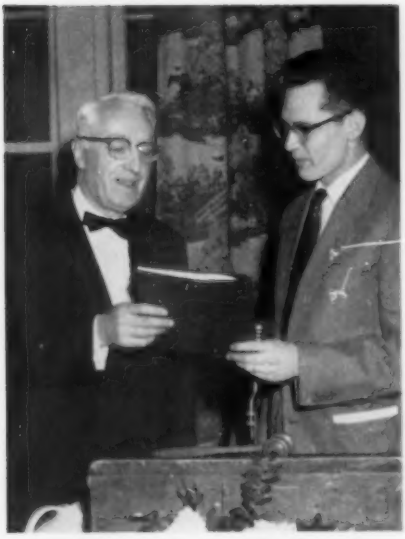
STATE OF FLORIDA PROVIDES TEN DENTAL SCHOLARSHIPS

A scholarship program designed to help students wishing to study dentistry and to provide dental health care for rural areas and small communities has been established by the Florida legislature. Each year ten scholarships paying up to $1,000 a year each for four years will be awarded to Florida students who want to study dentistry. To repay the scholarship, students agree to practice for five years in a rural community designated by the State Board of Health as one needing dental services. Scholarships are awarded by the Board of Health on recommendation of the State Board of Dental Examiners.

HAROLD OPPICE HONORED BY LOYOLA STUDENT GROUP

Harold Oppice, a past president of the American Dental Association, was honored by the Student American Dental Association of Loyola (Chicago) University at its recent clinic day. The "Award of Merit" given him was the first such honor to be bestowed by the student group.

Events during the student clinic day included six essays, 32 table clinics and an evening banquet. Winner of the $75 first prize for essays was Alexius Crowley, class of 1956, who spoke on "The Keystone of Successful Practice: The Diagnosis." The first prize for table clinics went to Hal Larson and James Cadwell, class of 1956, for a table clinic on the use of acrylic resin in crown and bridge prosthesis. At the banquet, the students



Harold W. Oppice (left), past president of the American Dental Association, was honored by the Student American Dental Association of Loyola University (Chicago) at its recent annual clinic day. Tom Wright, president of the student organization, presents the "Award of Merit" to Doctor Oppice.

presented Gustav Rapp the trophy awarded to the outstanding member of the faculty for the year.

International

DRAFT PRELIMINARY PROGRAM FOR AUSTRIAN MEETING

Six major areas of dental practice will be covered at the September 13-15 meeting of Austrian dentists to be held in Carinthia. The meeting is sponsored by the various dental organizations in the country.

According to the preliminary program, participants will discuss preventive dentistry, oral surgery, periodontal disease, removable and fixed partial dentures, orthodontics and the relationship between dentistry and dermatology.

American dentists interested in attending the meeting may write to Hans A. Richter, 10, Oktober Strasse, Klagenfurt, Austria.

CARL SEBELIUS TO HEAD WHO DENTAL PROGRAM

Carl L. Sebelius, Tennessee's state dental director, has been named dental officer for the World Health Organization. In his new post he will direct the WHO dental program for five of the six WHO regions. The regions cover 96 nations. Dental director for the sixth region, North and South America, is Mario M. Chaves of Brazil.

The WHO dental health section was established last year after a long campaign by the Fédération Dentaire Internationale. John W. Knutson, chief dental officer of the U. S. Public Health Service, was assigned for six months to the world organization to develop its dental program.

Dr. Sebelius will serve as dental officer for two years and will direct the WHO program from Geneva, Switzerland. He is a graduate of Northwestern University's dental school and received his Master of Public Health degree from the University of Michigan. Until his recent resignation, he was chairman of the American Dental Association's Subcommittee on Civil Defense. Dr. Sebelius has served as both president and secretary of the American Association of Public Health Dentists. He is former chairman of the Tennessee State Dental Association's Council on Dental Health and editor of the society's journal.

JUAN UBALDO CARREA, FAMED ORTHODONTIST, DIES

Juan Ubaldo Carrea of Argentina, one of Latin America's most distinguished dentists, died April 14. He was nearly 73

years old. Dr. Carrea, an orthodontist, was a specialist in forensic dentistry as well. He received his dental degree from the University Nacional de Buenos Aires in 1908 and taught at the school from 1915 to 1946.

He was founder and director of the review *El Odontólogo,* president of the Asociacion Odontologica Argentina, and past president of the Federación Odontológica Latino Americana. Dr. Carrea served also as secretary of the Academy of Sciences in Buenos Aires and was a vice-president of the Fédération Dentaire Internationale. In 1946 he received the first Miller International Award of the F.D.I.

Dr. Carrea was a member of the International College of Dentists and an honorary member of numerous dental societies in many countries of Latin America. He is the author of articles in orthodontics, forensic dentistry, prosthetics, anesthesia and dental history.

CHOOSE CAUDURO PRESIDENT OF BRAZILIAN SOCIETY

Haroldo Cauduro has been chosen president of the Sociedade di Odontologia do Rio Grande du Sur, according to a recent announcement. Other officers for the 1955-56 term are Ari Fonseca, vice-president; Italo Medeiros Faraco, executive secretary; Jacob Knijik, treasurer, and José Oscar S. Santos, librarian. The society previously was known as the Centro de Estudos Odontologos.

ELECT EXECUTIVE COMMITTEE FOR PARAGUAYAN SOCIETY

Artemio F. Salerno Netto of Asunción has been elected president of the Circulo de Odontologos of Paraguay. On March 25, the society elected a new executive committee composed of Dr. Netto; Victor A. Boettner, vice-president; César F. B. Franco, secretary; Miguel Angel Barreiro M., assistant secretary; Carim Bittar, treasurer, and Norman Zavala, assistant treasurer. Committee members are Reinaldo Mayans, Fernando González and Nicolás Pangrazio C. Alternates selected are Felix Juan Gulino and Juan Pablo Gorostiaga. Alejandro López de Filippis was chosen trustee.

ARGENTINE SOCIETY INDEXES SPANISH DENTAL LITERATURE

The 1953 volume of the *Indice de la Literatura Dental Periodica en Castellano y Portugues* has been published by the indexing committee in the library of the Argentine Dental Association. The 1953 volume is the second issued by the Argentine society. The society used the American Dental Association's *Index* as a model in preparing its publication.

PLEA FOR BOOKS MADE BY JORDANIAN DENTIST

Dentists who have spare books or who are publishing textbooks in any branch of dentistry have been urged to send copies for use in Jordan. An appeal for books has been received from George Soudah of Madaba, Jordan, a member of the Fédération Dentaire Internationale. Dr. Soudah writes that the shortage of books is acute. Books may be sent directly to Dr. Soudah in Madaba or to the F.D.I., 35 Devonshire Pl., London W. 1.

ITALIAN DENTAL CONGRESS CALLED FOR SEPTEMBER

The 31st Italian Dental Congress of the Italian Medical-Dental Association and the Italian Dental Association will be held in Florence September 24-29. Topics are diagnosis and therapy used in dentofacial orthopedics, modern theories on the physiology and pathology of salivary glands and technics of dental materials. Essayists are Prof. A. Maggioni, Prof. R. Bandettini and Prof. G. Pejrone.

The Twelfth International Dental Congress of the Fédération Dentaire Internationale will be held in Rome, Italy, September 7-14, 1957. The Palazzo dei Congressi (above) is one of the buildings that will be used for the Congress. Pio Lalli of Rome is general secretary of the Congress.

SIMULTANEOUS TRANSLATION PLANNED FOR PARIS MEETING

Simultaneous translation into several languages will make it possible for visitors from many countries to take part in the Thirtieth Paris International Dental Meeting November 26 to December 2. Round table discussions and table clinics as well as color television presentations are planned for the scientific program. Those wishing to attend may write the treasurer, L. J. Cecconi, 85, rue de Rivoli, Paris, France.

PANAMA SOCIETY ELECTS OMAR RODRIGUEZ PRESIDENT

Omar Rodriguez has been elected president of the Dental Association of the Republic of Panama. Also elected are Alfredo Berguido, vice-president; Agustin Arango, treasurer, and C. S. Anguizola, general secretary. Chosen for the post of press and propaganda secretary is Damaso Ulloa; social and cultural secretary is Ignacio Lopez, and technical adviser is Rodrigo Nunez. The Board of Dental Examiners is Luis Aleman, Agustin Ameglio, Agustin Arango, Alfredo Berguido, Damaso Ulloa and Aida Illueca.

PERUVIAN DENTISTS TO HOLD SEPTEMBER CONGRESS

The Peruvian Society of Dental and Maxillofacial Prosthesis will celebrate its tenth anniversary September 19-22 in Lima by holding its first national congress. Dentists from the United States are urged to attend, announces Ricardo Salazar S., president. Information about the congress may be obtained from Dr. Salazar, Pasaje Olaya 156, No. 38, Lima, Peru.

Public Health

LAUNCH CAMPAIGN TO SPUR FLUORIDATION

Prominent medical, dental and civic leaders in mid-June launched a committee to spur adoption of fluoridation. Named the Committee to Protect Our Children's Teeth, Inc., the group is headed by Benjamin Spock, M.D., noted pediatrician and author of books and articles on child development and child care. A dental advisory council is being formed under the chairmanship of C. Raymond Wells, president of the New York Academy of Dentistry and former president of the American Dental Association.

In announcing formation of the committee, Dr. Spock said the campaign will be concentrated in New York City, where hearings on the health measure are scheduled to begin shortly. The New York Board of Health has recommended adoption of the procedure, and New York's health commissioner, Leona Baumgartner, M.D., has joined the committee.

An educational campaign is to be launched by the committee, Dr. Spock announced. Tax-deductible contributions are being accepted by the State Charities Aid Association, a member group, with headquarters at 105 E. 22nd St., New York. A $100,000 budget is planned.

Describing the need for a public education campaign, the noted physician stated, "Before obtaining full benefits from any stride forward, there is usually an interim between possession of knowledge and its general application for public benefit. Perhaps the largest gap we now know how to close is in prevention of tooth decay."

Dr. Spock pointed to the vigorous campaign carried on by antifluoridationists. "No valid evidence has been offered to support these claims [of dangerous effects of fluoridation]," he said. "And yet in most cities where the issue is joined, the scare campaigns delay acceptance of what is considered the greatest public health advance in the past 25 years."

A partial list of the members of the Committee to Protect Our Children's Teeth, Inc., follows:

Walter C. Alvarez, M.D., editor-in-chief, *Modern Medicine;* George E. Armstrong, M.D., director, N.Y.U.-Bellevue Medical Center; Mrs. Max Ascoli, vice-president, Citizens' Committee for Children; Reginald M. Atwater, M.D., executive secretary, American Public Health Association; George Baehr, M.D., president, Health Insurance Plan of Greater New York; Chester I. Barnard, former chairman, National Science Foundation; Leona Baumgartner, M.D., president, National Health Council and Commissioner of Health, New York City; Rev. Joseph A. Belgum, rector, Norwegian Lutheran Hospital; Frank G. Boudreau, M.D., Milbank Memorial Fund; Arnold H. Bringewatt, executive secretary, Lutheran Child Welfare Association; Detlev W. Bronk, M.D., president, Rockefeller Institute for Medical Research; Margaret M. Bryant, president, American Association of University Women; John Caffey, M.D., consulting roentgenologist, New York Hospital; Charles S. Cameron, M.D., medical director, American Cancer Society; Harry J. Carman, dean emeritus, Columbia University; H. Daniel Carpenter, president, National Federation of Settlements; Martin Cherkasky, M.D., director, Montefiore Hospital; Richard S. Childs, chairman, National Municipal League; Dean A. Clark, M.D., general director, Massachusetts General Hospital; Gordon R. Clapp, former chairman, T.V.A.; Duncan W. Clark, M.D., chairman, Dept. of Environmental Medicine, New York State University College of Medicine; Marguerite Clark, medical editor, *Newsweek;* Charles Cook, director, University Settlement; Howard Reid Craig, M.D., director, New York Academy of Medicine; J. A. Curran, M.D., president, State University College of Medicine, New York; Stanley P. Davies, general director, Community Service Society; Watson Davis, director, Science Service; Adolph G. De Sanctis, M.D., director of pediatrics, University Hospital; State Senator Thomas C. Desmond; Gerald Dorman, M.D., medical director, New York Life Insurance Co.; Louis I. Dublin, consultant, Institute of Life Insurance; Mel-

vin H. Dunn, director, St. John's Episcopal Hospital; Gunnar Dybwad, executive director, Child Study Association of America; Herbert R. Edwards, M.D., Yale School of Medicine; Haven Emerson, M.D., professor emeritus, Columbia School of Public Health; Mrs. Henry Epstein; James H. Felt, chairman, New York City Planning Commission; Marshall Field, president, Child Welfare League of America; Anna Fillmore, R.N., general director, National League for Nursing; Henry I. Fineberg, M.D., president, Queensboro TB and Health Association; Morris Fishbein, M.D.; Charles Frank, M.D., president, Medical Society of Bronx County; Samuel Z. Freedman, M.D., president, Medical Society of the County of New York; Buell G. Gallagher, president, City College of New York; Lloyd H. Gaston, M.D., executive director, St. Luke's Hospital; Nicholas S. Gesoalde, secretary, New York State Pharmaceutical Association; Lester Granger, executive secretary, National Urban League; Mrs. Randolph Guggenheimer, chairman, Day Care Council of New York City; Frank P. Guidotti, M.D., medical director, New York Hotel Trades Council; Luther H. Gulick, president, Tax Research Foundation; Helen Hall, director, Henry Street Settlement, New York; Helen M. Harris, executive director, United Neighborhood Houses of New York; George J. Hecht, publisher, *Parents' Magazine;* Henry F. Helmholz, M.D., health chairman, National Congress of PTA's; Rev. Leland B. Henry, D.D., executive director, Social Relations Council, Protestant Episcopal Diocese of New York; Herman E. Hilleboe, M.D., commissioner of health, New York State; Ira V. Hiscock, president, American Public Health Association; Jane M. Hoey, director of social research, National Tuberculosis Association; L. Emmett Holt, Jr., M.D., director of pediatrics, Bellevue Hospital; Fred C. Hunt, M.D., director of pediatrics, St. Luke's Hospital; City Councilman Stanley M. Isaacs; Morris Iushewitz, secretary-treasurer, New York CIO Council; Hugh L. Jackson, president, Better Business Bureau; Mrs. Sophia Yarnall Jacobs, president, New York Urban League; Kenneth Johnson, dean, New York School of Social Work, Columbia University; H. V. Kaltenborn; Jack M. Kaplan, president, Welch Grape Juice Co.; Frank E. Karelsen; Norvin C. Kiefer, M.D., chief medical director, Equitable Life Assurance Association; Charles Glen King, scientific director, Nutrition Foundation; J. Donald Kingsley; William Kirk, secretary, East Harlem Day Center; Marcus D. Kogel, M.D., dean, Albert Einstein College of Medicine; Mrs. William S. Ladd; Alfred G. Langmann, M.D., chairman, New York section, American Academy of Pediatrics; Mrs. Trude W. Lash, executive secretary, Citizens' Committee for Children; Henry Smith Leiper, executive secretary, Missions Council, Congregational Churches; S. Z. Levine, M.D., director of pediatrics, New York Hospital-Cornell Medical Center; Mrs. David M. Levy; Vincent Lodico, M.D., Surgeon, St. Clare's Hospital; Basil C. Mac Lean, M. D., commissioner of hospitals, New York City; Leonard W. Mayo, director, Association for Aid of Crippled Children; Henry L. McCarthy, commissioner of welfare, New York City; Joseph Mc Goldrick, former comptroller, New York City; George Meany, president, AFL-CIO; Frank C. Montero, director, Urban League Fund; Newbold Morris, president, Children's Welfare Federation; James S. Murphy, M.D.; Peter Marshall Murray, M.D., past president, Medical Society of the County of New York; Gen. Frederick Osborn; Henry N. Pratt, M.D., director, New York Hospital; Donald G. Price, executive director, New York Heart Association; Leo Price, M.D., director, Union Health Center, ILGWU; Christine B. Quell, president, Practical Nurses of New York; George Reader, M.D., former chairman, New York Public Health Association; Walter P. Reuther, international president, United Auto Workers, AFL-CIO; Col. Harold Riegelman; Mrs. Franklin D. Roosevelt; Howard A. Rusk, M.D., associate editor, *New York Times;* Bela Schick, M.D.; Lulu Shaw, Morningside Community Center, New York; Wilson G. Smillie, M.D., executive director, State Charities Aid Association; Paul C. Smith, president, Crowell-Collier Publishing Co.; Ralph E. Snyder, M.D., dean, New York Medical College; Jane Stafford, Science Service; Ernest L. Stebbins, M.D., director, Johns Hopkins School of Public Health; Martin R. Steinberg, M. D., medical director, Mt. Sinai Hospital; Harry E. Tebrock, M.D., medical director, Sylvania Electric Products; Ray Trussell, M.D., executive officer, Columbia School of Public Health; Rev. V. Simpson Turner, director, Harlem Depository, New York Bible Society; Earl Ubell, science editor, *New York Herald Tribune;* Alfred J. Vignec, M.D., medical director, New York Foundling Hospital; Rev. Ralph Curry Walker, pastor, Madison Avenue Baptist Church; Bethuel M. Webster, past president, Bar Association of the City of New York; George M. Wheatley, district chairman, American Academy of Pediatrics; Abel Wolman, past president, American Water Works Association.

DENTAL ADVISORY COUNCIL — Chairman, C. Raymond Wells, D.D.S., president; New York Academy of Dentistry and past president, American Dental Association;

Francis Arnold, Jr., D.D.S., director, National Institute of Dental Research; Lester W. Burket, D.D.S., M.D., dean, University of Pennsylvania School of Dentistry; M. S. Burnham, D.D.S., president, First District Dental Society; H. William Frankel, D.D.S., chairman, Oral Hygiene Committee; M. J. Freedman, D.D.S., chairman, Council on Dental Health, First District Dental Society; Warren H. Hyde, D.D.S., president, Second District Dental Society; Emory W. Morris, D.D.S., president, W. K. Kellogg Foundation; Joseph J. Obst, D.D.S., past president, New York State Society of Dentistry for Children; Simon Shapiro, D.D.S., Dental Health Service; Herbert L. Taub, D.M.D., president, Dental Society of the State of New York; M. A. Weiner, D.D.S., president, Tenth District Dental Society.

LACK OF EDUCATION MAJOR CAUSE IN FLUORIDATION LOSS

Lack of a continued education program by proponents of fluoridation has been found to be a major reason for the dropping of the health measure in some 23 communities which previously had favored it. A report issued April 6 by the Bureau of Municipal Research of Syracuse, N. Y., stated that in nearly every case, city officials, newspaper editors and health groups interviewed reported that a small, organized and vocal minority, lacking factual evidence, but equipped with nationally circulated literature on the horrors of fluoridation had been responsible for the health measure's defeat.

"Proponents, unable to believe that the public would not accept public health authority for a public health measure, have normally been apathetic and have made little effort to inform the public of the conclusive evidence in favor of fluoridation," the report stated.

Repeal was not based on any confirmed reports of ill effect, on engineering difficulty, on illegality or on costs alone. Several communities reported studies which showed that the measure had reduced caries even in the relatively short period in which fluoridation was in effect.

FLUORIDATION URGED FOR NEW YORK CITY

Fluoridation for the nation's largest city was urged by the New York Academy of Dentistry at its annual meeting in New York April 12. The Academy's resolution endorsed fluoridation as an "aid in the prevention of dental caries for the people, particularly the children of the City of New York." In addition, the resolution

David H. Spencer (left) was honored by the Palo Alto, Calif., Junior Chamber of Commerce, for leadership of the Jaycees' successful campaign for fluoridation in the city. He reviews the Jaycee fluoridation scrapbook with incoming Jaycee president Andrew H. Stone. The Junior Chamber of Commerce at its recent state convention judged the Palo Alto campaign the outstanding public health project of any club in California and voted to make fluoridation its "project of the year."

commended Leona Baumgartner, M.D., city health commissioner, for her support of the caries preventive measure.

Chicago fluoridation, under way for the city's south side and 23 suburbs, is expected to be extended to the rest of the city and an additional 28 suburbs by July 1. In valve turning ceremonies May 1, Chicago's mayor Richard Daley termed fluoridation "another step forward for Chicago."

Meanwhile, Raton, New Mex., reported the start of a fluoridation project. The Raton program makes New Mexico the 45th state to have fluoridation. The three states in which fluoridation programs have not yet been reported are Arizona, Nevada and Utah.

POSITIONS OPEN FOR DENTISTS IN WASHINGTON

The Washington State Department of Institutions seeks dentists for positions in state schools for mentally retarded children, in the state mental hospitals and in adult correctional institutions. The salary range is $7,344 to $8,748. Applicants must be licensed to practice in Washington or must secure a license at the first meeting of the Board of Examiners after employment by the state. There is no written examination for the position. Further information may be obtained from Washington State Personnel Board, 212 General Administration Bldg., P.O. Box 688, Olympia, Wash.

SUPREME COURT UPHOLDS CLEVELAND FLUORIDATION

For the fourth time, the United States Supreme Court has dismissed an appeal against fluoridation. Late in May, it upheld the right of the city of Cleveland to adopt the health measure. Previously, the court had turned down appeals in similar cases from California, Oklahoma and Louisiana.

In this latest ruling, the court also denied a motion by the board of directors of the Christian Science Church to file a friend of the court brief opposing the measure.

General

EXTEND ILWU DENTAL PLAN; 8,000 SERVED IN FIRST YEAR

The prepaid dental health care program of the International Longshoremen's and Warehousemen's Union—Pacific Maritime Association on the West Coast is to be continued through June of 1957, it has been announced. The welfare fund's prepaid dental health care program completed its one year test period coastwise at the end of May.

In announcing extension of the program, the ILWU-PMA welfare fund trustees reported that 11,000 West Coast children are now covered in the plan. During its first year of operation, care was provided 8,000 youngsters, nearly 80 per cent of those enrolled at the start.

"About half these children had never been to a dentist before," the trustees' report stated. "Today most of the children have had the greater part of their dental needs cared for. The dental program cost the welfare fund $616,000 for the pilot year.

CRASH KILLS INDIANA DENTIST OF THE YEAR

George H. Denison, 89 years old, chosen dentist of the year at the annual convention of the Indiana State Dental Asso-

ciation in Indianapolis last May was injured fatally in a traffic accident June 14. Dr. Denison, believed to be the oldest practicing dentist in Indiana, had practiced dentistry 62 years. He was injured in a two car crash and died 15 minutes later in the Holy Family Hospital in LaPorte.

WILLIAM GIES, OUTSTANDING LEADER IN DENTISTRY, DIES

William J. Gies, one of dentistry's most distinguished men, died May 20 at his home in Lancaster, Pa. He was 84 years old. Dr. Gies, although not himself a dentist, made major and pioneering contributions to dental research, dental education and dental publications. His contributions in his own field, biological chemistry, also were legion.

He is known to the dental profession as the founder of the *Journal of Dental Research,* which published its first issue in 1919, and which he edited for 17 years. In 1920 he organized the International Association for Dental Research, which has had world-wide influence in the promotion of research.

William J. Gies

At Columbia, where he taught, he was chairman of the executive committee of the School of Dental Hygiene, proposed the organization of a dental department at the school and served as a member of its organizing committee. Later he served as secretary of the administrative board of the dental school. He also founded the first department of biological chemistry in a medical school.

In 1921, under the auspices of the Carnegie Foundation, Dr. Gies engaged in a five year study of dental education in the United States and Canada. In 1923 he initiated the negotiations which led to the merger of four organizations into the American Association of Dental Schools. As a member of an AADS special committee, he helped obtain an appropriation from the Carnegie Foundation for the Dental Curriculum Survey begun in 1930.

At a testimonial dinner given for him on his retirement from the medical teaching staff at Columbia University in 1937, it was said of him: "Today, his name is to dentistry as Flexner's and Reed's are to medicine and law respectively."

LOREN T. HUNT DIES, FORMER ASSOCIATION OFFICIAL

Loren T. Hunt, for many years a member of the American Dental Association's House of Delegates, died June 16, at the age of 62. He was buried in Friend, Nebraska.

Dr. Hunt, who practiced in Lincoln, taught at the University of Nebraska. He had practiced in Lincoln since his graduation from the University of Nebraska School of Dentistry in 1915.

Dr. Hunt was a past president of the Nebraska Dental Association, a Fellow of the American College of Dentists and a past supreme president of Xi Psi Phi, dental fraternity.

In addition to serving the national organization in its House of Delegates, Dr. Hunt had been a member of the Association's Council on Dental Health.

R. M. WALLS, PROMINENT DENTAL LEADER, DIES AT 68

Raymond M. Walls, former chairman of the economics committee of the American Dental Association, died June 16

in Coconut Grove, Fla. He was 68 years old. Dr. Walls was retired at the time of his death.

In the late 1930's and early 1940's, Dr. Walls wrote extensively on economic and sociological aspects of dentistry. His articles covered such topics as the costs of conducting a dental practice, the economic status of the dental profession, dental needs of adults and insurance programs affecting dentistry.

He was a founder of the American Association of Industrial Dentists and served as its president. He was consultant to the U. S. Children's Bureau and was a Fellow of the American Public Health Association. Dr. Walls was a graduate of the University of Pennsylvania School of Dentistry.

CHARLES KENDALL, NOTED LECTURER, DIES AT 64

Charles H. Kendall, of Whitefish Bay, Wis., nationally known authority on practice management, died June 11 at the age of 64.

A graduate of Northwestern University Dental School, Dr. Kendall served on its faculty from 1925 to 1953. During 33 years of dental practice, he lectured extensively on practice management throughout the country.

A life member of the Wisconsin State Dental Society, he was active in various dental groups. He was a past president of the Greater Milwaukee Dental Association, Inc., was a member of the American College of Dentists and of Delta Sigma Delta.

A.M.A. PRINT SHOP SETS LAST LINES OF TYPE IN JUNE

The American Medical Association's print shop, located in its Chicago headquarters, was closed after printing the June issues of A.M.A. publications. The Association gave as the reason the organization's rapid growth which places headquarters space at a premium and the need for modernization of printing facilities. A.M.A. publications, after 70 years of being printed in the A.M.A. shop will be printed by McCall Corporation, the firm which, since 1950, has published *Today's Health*. Editorial functions will still be carried on in the A.M.A. office.

Also • An Athens, Ga., dentist, Nathaniel G. Slaughter, is featured on the cover of the April 15 issue of *Christian Advocate*, publication of the Methodist Church. The 72-year old dentist was a delegate to the 1956 General Conference of the Church and had the distinction of having attended more General Conferences than any other lay member of the Conference. The magazine also carried a feature story on Dr. Slaughter. . . . As a result of mouth protectors supplied by the Natchez (Miss.) Dental Society, there were no mouth injuries to any of the local high school football players during the last football season. . . . The American Dental Assistants Certification Board, Inc., will hold an examination in Atlantic City, N. J., September 29. . . . A lecture in Spanish was given at the recent annual scientific meeting of the Colegio Cirujanos Dentistas in Puerto Rico by Charles C. Berger of New York. . . . Tyronza, Ark., population 600, played host to the joint meeting of the first, second and third districts of the Arkansas Medical Society May 24. Representing dentistry on the program was Daniel F. Lynch, past president of the American Dental Association. Dr. Lynch was introduced by W. R. Alstadt, Trustee for the Twelfth District. . . . Employees of the California Dental Association are among health workers who have formed a credit union. Some 360 employees of health organizations are eligible for membership.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*

The Editor

ANESTHESIA IN THE DENTAL OFFICE

I have just read the abstract of Francis M. Grem's article on general anesthesia in dentistry which appeared in the May issue of THE JOURNAL in the current literature section. I am surprised that such an article would be published in a dental journal without some comment.

I recently attended a short course in dental anesthesiology given by physicians, and although they invited dentists to the course, they ended up with the same admonishment, "If you ever want to operate under general anesthetic, get a physician to give it."

I doubt that 10 per cent of the people who have received general anesthesia have received it with all of the examinations, the precautions, equipment and so forth described by Dr. Grem. Yet, according to an article from the JOURNAL OF ORAL SURGERY, July 1955, general anesthesia given in the dental office is safe.

This article described research over a period of ten years in New York City. The heading was "The Safety of Anesthesia in the Dental Office." In table three, anesthetics in dental offices over ten years, only eight deaths are shown in New York City: two known deaths from procaine; six from nitrous oxide; none from the intravenous barbiturates, so dangerous, according to the physicians, that some of them will not use it. A total of eight deaths in New York City—the average pedestrian mortality rate is higher than that. A person is safer in a dental office under general anesthesia than on the street.

The instructors on anesthesia in the dental schools are generally physicians. Are they members of the only profession that knows anesthesiology? They give students information in such a way that they are literally scared to death of general anesthesia when they graduate. And then articles like Dr. Grem's appear in dental magazines and keep them that way.

I have used general anesthesia in my dental office continuously for about 36 years. I know from a long successful practice that general anesthesia in the average dental office has a very useful place, and I would like to see someone with some power fight the vicious propaganda put out by the physicians.

Otto Hine, D.D.S., Muskogee, Okla.

USE OF POLYANTIBIOTIC PASTE

In the case report of sensitivity to polyantibiotic paste (penicillin-streptomycin-bacitracin-caprylate sodium) by Gunter Schmidt in the February issue of THE JOURNAL (page 196), one particular aspect of treatment must be considered.

The patient's adverse reaction followed the use of the polyantibiotic paste which had been injected under slight pressure. Originally, the paste had been sealed in the canal without pressure, and no reaction occurred. Then between October 30, 1954, and January 20, 1955, the patient developed a sensitivity to some ingredient of the paste.

My original experience with the polyantibiotic paste was somewhat similar. Slight pressure was used in its injection. Periodontitis followed. Both involved teeth were opened and permitted to drain. When they were no longer sore to percussion, treatment with the polyantibiotic paste was reinstituted. This time no pressure was used, and the treatment terminated satisfactorily.

The description Dr. Schmidt gives is certainly typical of a sensitivity reaction. There is no doubt that his report is authentic. Polyantibiotic paste is not to be used with pressure in endodontic treatment. Louis I. Grossman has an excellent article in the September 1951 issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION which covers the background and essentials of treatment with polyantibiotic paste.

Donald C. Seberg, Corpus Christi, Texas

Cases and Comments

CENTRAL GIANT CELL TUMOR OF THE MANDIBLE

By Donald R. Mackay, D.D.S., St. Paul.

The patient, a 22 year old woman, was first seen September 17, 1946, at which time she complained of a swelling of her chin and a "numb feeling" in her lower front teeth.

The patient was well developed, normal and in good physical health. A firm swelling across the symphysis of the mandible extended laterally to about the second bicuspid on the right side and to the cuspid on the left side. The swelling extended from the mucobuccal fold downward to the point of the chin.

The texture of the gingiva over the swelling was within normal limits. There was no gingivitis nor adenitis; occlusion was normal. There was a moderate expansion of the inferior labial plate. There was no anesthesia of the lower lip, and there was no evidence of perforations of the lingual plate. The results of a vitality test on the lower teeth showed that all were within normal limits with the exception of the four lower incisors, right cuspid and first bicuspid.

Full mouth periapical intraoral roentgenograms as well as right and left oblique and posteroanterior head roentgenograms were taken.

The working diagnosis was possible tumor of the mandible extending across the symphysis. The roentgenograms showed bulging of the inferior labial plate (Fig. 1). On September 21, 1946, tissue was removed under local anesthesia for biopsy. The report of the pathologist was "giant cell tumor of bone (benign) low grade."

On September 28, 1946, under bilateral block anesthesia (2 per cent procaine) with premedication of atropine sulfate, 1/150 grain, and pentobarbital, 3 grains, the tumor was removed. All teeth were left intact.

The surgical procedure was as follows. The mucoperiosteum and depressor complex of muscles was laid back from the second bicuspid on the right side to the first bicuspid on the left side, and a mass approximating the size of a large walnut was delivered. The cavity

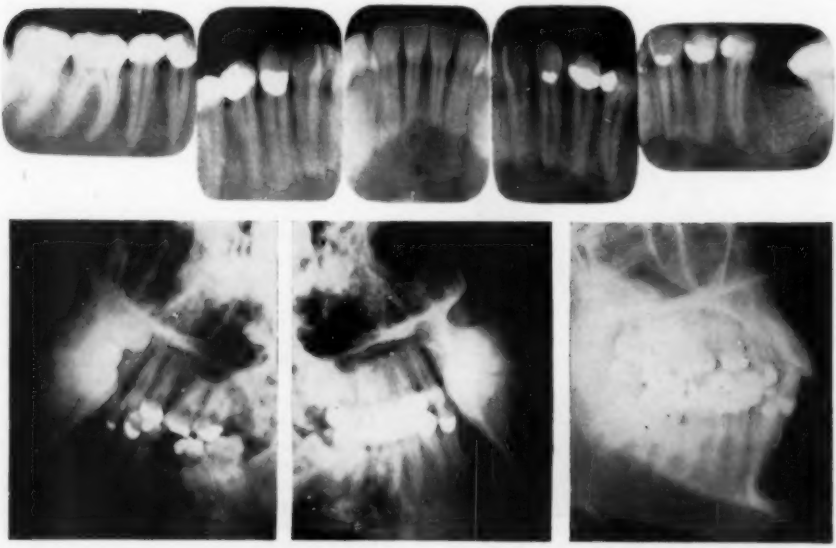


Fig. 1 • Roentgenograms reveal presence of tumor through symphysis of mandible

Fig. 2 • Two months postoperatively, bone regeneration was occurring in region from which tumor had been removed

Fig. 3 • Lower right first bicuspid shows periapical radiolucency four months after removal of giant cell tumor from mandible

Fig. 4 • Periapical intraoral roentgenograms show radiolucent area persisting below apex of central incisor five months after resection of recurrent giant cell tumor

was cauterized with 95 per cent phenol followed by alcohol. There was an extension of the tumor to, but not including, the mental foramen on both sides of the mandible. Most of the anterior plate of the mandible had eroded away, and a lingual erosion with perforation had occurred on the right side inferior to the mylohyoid muscle just lateral to the tubercle of the geniohyoid muscle.

The operation was followed with a routine dressing and closure. Lateral and postero-anterior roentgenograms taken November 25, 1946, two months postoperatively, showed that bone regeneration was occurring (Fig. 2). Recovery was uneventful until February 8, 1947, at which time the patient complained of pressure on the right side over the region of the lower right first and second bicuspid. A peri-

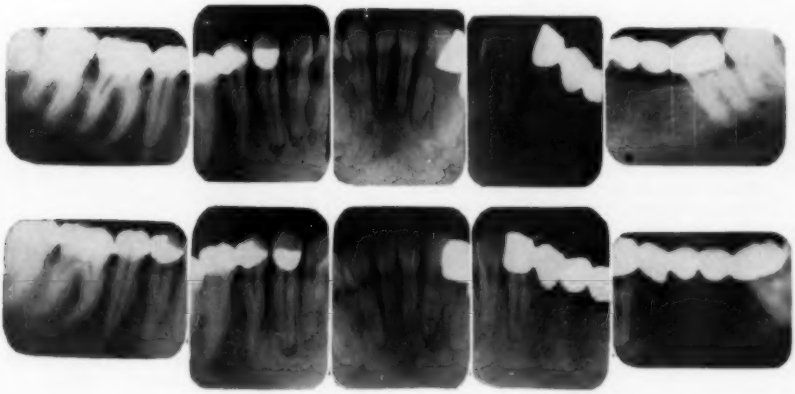


Fig. 5 • Above: Two and a half years postoperatively. Below: Three and a half years postoperatively. No recurrence of tumor

apical roentgenogram (Fig. 3) showed the lower right first bicuspid to have periapical radiolucency.

As the tooth was nonvital, it was extracted, and periapical tissue was removed for further biopsy. The bicuspid had a putrescent pulp. The biopsy was returned with a report of recurrent central giant cell tumor (benign).

On April 24, 1947, a resection of the recurrent central giant cell tumor was performed. The cavity was cauterized with 95 per cent phenol followed by alcohol. Recovery was uneventful until October 11, 1947, at which time a radiolucent area was noted below the central incisors in the symphysis (Fig. 4). The patient was kept under observation until December 13, 1947, when a punch biopsy was taken that confirmed a recurrence of the growth.

On consultation with the radiologist, the patient was given four treatments of roentgenotherapy from January 13, 1948, to February 24, totaling 1,000 r. Subsequent roentgenograms and clinical examinations produced no evidence of growth of the tumor, and a complete regeneration was accomplished with no deformity or loss of teeth.

Periapical intraoral roentgenograms were taken on June 13, 1949, and on October 14, 1950 (Fig. 5). There was no evidence of recurrence. There was, however, a breakdown of the periapical tissue and root structure of the lower left cuspid. Clinically, the patient had no complaint regarding this tooth until April 1951 at which time a carious involvement of the crown necessitated its extraction.

A biopsy for giant cells of the apex of the tooth was negative. By August 1953, complete regeneration of the terminal branches of the inferior maxillary nerve has taken place. The regeneration was confirmed by clinical test, insofar as the lip was concerned. There was no vitality of the anterior teeth. The teeth were normal in color.

Conservative surgical treatment of giant cell tumors has been widely practiced since the time of Nelaton and has produced excellent results. Thorough extirpation of the tumor mass, followed in the more active cases by cauterization with zinc chloride or phenol, has been followed by restoration of the bone in a high proportion of cases, yet there are several limitations to the surgical treatment of this disease. Recurrences are not always prevented, infection not infrequently supervenes, and resection may terminate a series of unsuccessful operations.

Biopsy may fail to establish an accurate diagnosis, thus leading to procedures which often aggravate the condition so as to interfere with radiation. The introduction of radiation therapy for giant cell tumors, therefore, represents a distinct advance.

The response to radiation of giant cell tumors is of much diagnostic value, since these tumors respond by slow absorption while osteogenic sarcoma is resistant. There is much evidence to show that giant cell tumors in most cases, even in advanced stages, may be controlled by roentgenotherapy, and the structure restored to a good functional state. This method is especially to be preferred in the stress-bearing bones. It is steadily replacing the surgical treatment of the disease.

925 Lowry Building

Book Reviews

LOCAL ANALGESIA, HEAD AND NECK

By Sir Robert MacIntosh, M.D., and Mary Ostlere, M.B. 138 pages with 145 illustrations. Index. $6.50. Baltimore, Williams & Wilkins Co., 1955.

This short monograph describes technics which the authors have found useful in providing analgesia for operations on the head and neck. Recognizing that the successful outcome of anesthetic technics depends in large measure on the knowledge of the relevant anatomy, the authors devote the first ten chapters exclusively to brief anatomical reviews. The lack of detailed written descriptions is adequately compensated for by clear, bold, colored illustrations. The important cranial and spinal nerves as well as the anatomy and physiology of the autonomic nervous system are dealt with. Separate chapters are devoted to reviews of the anatomy of the orbit, nasal cavity and sinuses, mouth and tonsil region.

The second half of the book describes specific technics for anesthetizing regions of the head and neck. The regions are handled in separate chapters. The descriptions are concise. One short chapter deals with the analgesia of dental surgery. The other chapters consider the ophthalmologic and otorhinolaryngologic regions. The book is addressed to practitioners. It reviews and adds to existing knowledge. Its easily read, informative contents make it a worthwhile book for the head and neck surgeon.

Herbert J. Bloom

THE DESIGN AND CONSTRUCTION OF REMOVABLE ORTHODONTIC APPLIANCES

By C. Philip Adams, B.D.S. 96 pages with 144 illustrations. Index. 17 s. 6d. Bristol, England, John Wright & Sons, Ltd., 1955.

This book endeavors to establish a systematic approach to the construction of removable orthodontic appliances and to discuss their usefulness and limitations so that they may be placed in their proper relationship to the other means available for the mechanical treatment of irregularity and malocclusion of the teeth.

The book is based on a series of articles, published originally in the *Dental Practitioner*, which dealt with the mechanical principles of orthodontic appliances in general and the design of removable appliances in particular, the soldering of stainless steel for removable appliance construction and the preparation of coil springs. To this material has now been added a fresh chapter discussing the several factors which affect the design and construction of a removable appliance. Frequent reference is made to specific examples illustrated in other parts of the book and to chapters on the problems of orthodontic technic and on the design and construction of orthodontic clasps.

There is nothing particularly unusual about this book (except its brevity). Much of its material is included in the larger textbooks in orthodontics that have been published in this country.

William F. Ford

ORTHODONTICS FOR DENTAL STUDENTS

By T. C. White, J. H. Gardiner and B. C. Leighton. 367 pages with 218 illustrations. Index. $8. New York, John de Graff, Inc., 1955.

The authors have endeavored to present a textbook "solely on orthodontics and confined to the requirements of the undergraduate dental student." Also they hope "that the general practitioner will find much of value to assist him in the diagnosis of the various orthodontic anomalies which involve the masticatory apparatus, and in his treatment of the more simple forms."

In general, this book is easy reading despite the British word usage and sentence structure. Some idea of the organization and scope may be gained by noting the book's major divisions and the space devoted to each: normal growth and development, 61 pages; abnormal development, 77 pages; diagnosis, 51 pages; prevention and treatment of malocclusion, 155 pages. The subjects are presented as separate topics with numerous subdivisions, thus facilitating indexing and cross-referencing. This arrangement may not appeal to readers who prefer the "case" approach. Most of the terminology is sufficiently descriptive so that meaning is clear. However, the eponyms and some of the less widely known usages, such as "gagging" of the posterior teeth, might well be omitted or restricted to the volume designed for British use rather than offered for export.

Within the main divisions of the text, the

authors follow a satisfactory outline. However, some of the subtopics are discussed much more fully than others. For example, in the discussion of morphological development of the head, twice as much space is devoted to a description of the bones and muscles of the head region than is used to present the growth changes in the cranial and facial skeleton. In the second subdivision, morphological development of the dental arches, the gum pads of the infant are described in more detail than is normal adult occlusion.

Removable appliances, functional treatment and extraction of teeth are prominent parts of the section on treatment of malocclusion. The relatively few illustrations of malocclusions before and after treatment are not sufficient to give a novice in dentistry an understanding of either the possibilities or the limitations of orthodontic management of occlusion problems. Nevertheless, this book offers much useful information and many interesting interpretations as well as an overview of current orthodontic concepts in Great Britain.

Thomas D. Speidel

THE RELIEF OF SYMPTOMS

By Walter Modell, M.D. 450 pages with 14 tables. Index. $8. Philadelphia, W. B. Saunders Co., 1955.

This practical guide applies familiar material to the everyday problem of relieving symptoms. Relieving the distress of symptoms is an important part of medical care, a part which is sometimes sacrificed to the greater objective of curing disease. The author considers that 24 symptoms apply to 95 per cent of the common disorders. Some symptoms appear separately, while others occur in various combinations and permutations.

The book is divided into three parts—theory, practice and counsel. The author stresses symptomatic analysis and amelioration. He points out that the alleviation of pain is not always possible through an attack on the underlying cause; hence nonspecific types of treatment are necessarily followed. Anesthetics and analgesics, with all their limitations, must be used. The specific treatments administered are nitrates for anginal syndromes, special drugs for vascular spasm, anticholinergic drugs for intestinal spasm, antacids, ergotamine and special drugs to relieve gout.

The author's approach is good but, unfortunately, his discussion is limited to the most common symptoms. Certainly, these symptoms usually are not the main reasons which bring the patient to his physician or dentist. Although the book is a pharmacological approach to practice, there is no emphasis on the proper interpretation of symptoms; the emphasis is on securing momentary relief before treatment.

Recent advances in chemical, physical and physiological methods have unraveled the fundamental mechanisms of many symptoms. A thorough understanding of the mechanism of symptoms enables a physician to probe with greater precision the morbid processes within the body.

Some important symptoms of systemic origin, as well as some which have value in locating the site of the disease, have been omitted. Among these are thirst, tenesmus, sneezing, syncope and bleeding. But in spite of the omissions the approach is scientific, logical and enlightening.

I. Newton Kugelmass

THE DYNAMIC EQUILIBRIUM OF BODY PROTEINS, HEMOGLOBIN, PLASMA PROTEINS, ORGAN AND TISSUE PROTEINS

By George H. Whipple, M.D. 68 pages with illustrations. $3.25, Springfield, Ill., Charles C Thomas, 1956.

Protein metabolism in the body is as fundamental to dental metabolism as to other organs and tissues of the body. Consequently, this short monograph by a competent researcher is a welcome addition to the current literature in nutrition. The book explains how plasma protein contributes to the store of intracellular protein when the need arises for new proteins. The author introduces the concept of the "protein pool," a term which indicates that within the total mass of body protein there is ready interchange between the protein in circulation, the extracellular fluids in the cells and in the reserve stores. The book explains the function of protein metabolism in health and in disease.

Experimental studies indicate how parenteral plasma provides all body protein requirements, how globin administered from hemoglobin is utilized for new hemoglobin, for plasma protein formation, how reserve stores of body proteins are formed and maintained, how these stores contribute to the formation of body proteins and how the placenta serves the protein needs of mother and fetus. These studies explain also how inflammation decreases hemoglobin production, how plasma protein is synthesized in the liver and how protein best serves as an immunizer in health and in disease.

I. Newton Kugelmass

DYNAMICS OF LIVING PROTOPLASM

By L. V. Heilbrunn. 327 pages with 64 illustrations. Index. $6.50. New York, Academic Press, 1956.

This monograph represents a lifetime work on living protoplasm. The author finds that protoplasm within the cells is in a fluid state; dispersed granules increase viscosity. The outer part of the protoplasm is a rigid cortex, seemingly a single layer of calcium proteinate granules, which serves as a delicate membrane.

The cortex can bind calcium ions and release them, a process which makes the cortex a calcium electrode invaluable in the electrochemical behavior of the cells. The cell interior similarly contains a chloride electrode. Both of these electrodes contribute to the bioelectric potentials of cell activity.

When a cell is exposed to stimuli, the cortex is liquefied, and calcium is released into the interior. As calcium enters the cell interior, it activates an enzyme which causes protoplasm to clot. This involves a change of sulfhydryl (SH) to disulfide (S-S) groups, a change which initiates oxidative reactions essential for metabolic activity.

The author unravels the dynamic nature of the living cells from the standpoint of their properties, functions, division and homeostasis. The same principles are applicable to all tissues of the body. This monograph is a great stimulus to the reflective student of medicine and dentistry as it gives an insight into fundamental processes of cell life.

I. Newton Kugelmass

BIOCHEMICAL MECHANISMS IN INFLAMMATION

By Valy Menkin, M.A., M.D. Second edition. 438 pages with 166 illustrations and 24 tables. Index. $9.50. Springfield, Ill., Charles C Thomas, 1956.

This second edition is a complete revision of the former textbook titled *Newer Concepts of Inflammation,* published in 1950. In the process of revision a good deal of new material has been added. Instead of the original five chapters, the book now consists of ten chapters, including the preface to the first edition and a preface to this edition. Each chapter ends with a summary and bibliography. Indexes to an extensive list of authors and comprehensive subject matter are included.

Chapters have been added covering the role of the hydrogen ion concentration and the cytology of an exudate, glycolysis in inflammation, some aspects of the chemistry of exudates, the pattern of injury in inflammation (necrosin), cause of fever in inflammation (pyrexin), chemical factors in acid exudates concerned with mechanism of leukopenia and leukocytosis, determination of white blood cell level with inflammation, repair, cellular injury, possible relation to neoplasia and precancerous lesions and the anti-inflammatory problem.

The latter chapter deals with the all-important anti-inflammatory problem of corticoids and ACTH. The author did pioneer work on this subject in 1940 and 1942. His observations and those of other investigators are described. Their studies led to the clarification of the mechanism involved, namely, a suppression of cellular activity by the corticoids.

The present volume is a signal achievement. From the standpoint of content, presentation and illustrations, this is one of the most outstanding books on the subject ever published. It is valuable as a reference text for students and practitioners of medicine and dentistry. The book is attractively bound, the paper is good and the type clear, a fine example of the printers' art.

E. Alan Lieban

PUBLIC HEALTH—ITS PROMISE FOR THE FUTURE

By Wilson G. Smillie, M.D., D.P.H. 501 pages with 50 illustrations. Index. $7. New York, The Macmillan Co., 1955.

This chronicle of the development of public health is a fascinating portrayal of the events and personalities that contributed to the status of health activities up to 1914. A well written, fairly comprehensive book for which a tremendous amount of research evidently was done, it should be a valuable reference source for those engaged in public health. To some lesser extent, it should be of value also to other members of health service professions. Although the years covered (1607-1914) are divided into three periods, these are not so strictly adhered to as to create any discontinuity in the chronological presentation. Nor does the text verge into the philosophical regarding the future. The subtitle "Its Promise For The Future" serves only to emphasize that any future, even if unspecified and unpredicted, is to be based on past events.

Although the book stresses those phases of public health involving the field of medicine, most other present-day facets of community health activity are discussed. Dental health, except for one casual reference to dental caries, unfortunately is not mentioned. Exclusion of

this subject because it was formally inaugurated in health department activities only after 1914 does not justify the omission. There were dental health projects during the periods discussed in this book. There was a recognition of the need for more dental health services, preventive, remedial and educative.

Many of the book's readers will disagree with the appended selection of outstanding pioneers in public health. The book has value, however, as it provides much data (some possibly but little known) relative to the development of public health activities and to those personalities who aided in that development.

Richard C. Leonard

PHYSIOLOGY AND PATHOLOGY OF INFANT NUTRITION

L. F. Meyer, M.D., and Erich Nassau, M.D. Translated by Kurt Glaser, M.D., and Suzanne Glaser, B.A. Second edition. 533 pages with 61 illustrations. Index. $11.50. Springfield, Ill., Charles C Thomas, 1956.

This translation from the German summarizes the physiological fundamentals of infant nutrition and discusses natural and artificial feeding based on the prewar pediatric experience of the authors. The second half of the book is devoted to disturbances in nutritional processes and includes detailed guidance in diagnosis and treatment. After a discussion of the normal development of an infant and the chemistry of infant nutrition, the authors present the continental methods of infant feeding which are consistent in principle with American procedures.

Some consideration is given to the development of the teeth in relation to the general development of the body from the standpoint of preventive pediatrics. The nutritional disturbances due to deficiencies and defects are discussed in terms of those disorders common in Europe and Africa. The book is sound scientifically, but the reading is at times difficult because of the literal translation. Nevertheless, the book is a valuable guide to modern clinical infant nutrition.

I. Newton Kugelmass

HYPNOSIS AND ITS THERAPEUTIC APPLICATIONS

Edited by R. M. Dorcus. Index. $7.50. New York, McGraw-Hill Book Co., 1956.

Competently prepared by seven psychologists and one dentist (with the notable omission among contributors of representatives of the fields of medicine and psychiatry), this book presents a comprehensive survey of the theoretical, experimental and therapeutic aspects of hypnosis. The volume, prepared primarily as a textbook, is supplemented by an extensive bibliography for each chapter and an adequate index. The wide variety of clinical and experimental material presented and the recurring emphasis on limitations and caution in application of hypnotic technics provide the reader with a firm foundation for the evaluation and therapeutic application of hypnosis.

The chapter devoted to hypnosis in dentistry rightly emphasizes the elimination of "fear, anxiety, tension, hostility and pain" in dental patients. This reviewer cannot accept as the responsibility of the dentist the application of hypnosis for the removal of habits and traumatic memories. Neither can the reviewer agree with the reliability of age regression under hypnosis as a means of re-establishing vertical dimension in the edentulous patient. In addition, he cannot agree with the contributing dentist's conclusion in regard to hypnosis that "we have to date but scratched the surface of its import to the dental practitioner. . . ." A more realistic appraisal of the true value of hypnosis to dentistry is in order.

W. O. Ramsey

A COMPLETE FIXED BRIDGE PROCEDURE

By David H. Coelho, D.D.S., and Julian M. Rieser, D.D.S. Second edition. 139 pages with 157 illustrations. Index. $5.50. New York, New York University Press, 1955.

The authors wrote this book to meet the need for a technical manual that explains in simple, concise terms the exact methods used in the construction of a fixed bridge. In this endeavor, they have succeeded. Although not intended as a complete treatise on fixed bridge procedure, this manual gives in considerable detail chair and labor tory procedures to be followed in making a idge by a single technic—one which the a..thors state is known to be sound.

This revision is an improvement over the first edition, published in 1949. The earlier edition was in multigraphed form and paperbound; the present is printed on glazed paper, which gives greater clarity to the illustrations. The print is easier to read, and the book is clothbound. A table of contents and an index, which were lacking in the first edition, have been provided. Much of the material is rewritten, and there are some new illustrations.

A chapter on indirect bridge construction, using alginate hydrocolloid, has been added.

Emphasis has been placed on the need for full cast gold or cast gold veneer crowns as abutments of choice in fixed bridge construction, with the three-quarter crown as a second choice. The preparation of the teeth for these abutments and the direct and indirect methods of making wax patterns for the full and three-quarter crowns are adequately covered in the text and by illustrations. Chapters on treatment planning, occlusal balance and parallelism, which precede those on technical procedures, add greatly to the value of the work.

Although this book was written for the guidance of students in the dental schools, many practitioners would find it of value also.

Robert E. Blackwell

ANTISEPSIS, ASEPSIS, ANTISEPTIKA (ANTISEPSIS, ASEPSIS, ANTISEPTICS)

By the editorial staff of the Great Soviet Encyclopedia. Reprint from the series on medicine. 20 pages. DM. 0.50. Berlin, VEB Verlag Volk und Gesundheit, 1954.

This booklet deals in an interesting manner with many theoretical and practical aspects of antisepsis and asepsis and describes many of the antiseptics frequently used in dental and medical practice in Russia, the Soviet zone of Germany, and in the East European and East Asian countries.

There may be readers who will disagree with some of the conclusions in regard to the effectiveness of technics or drugs recommended or with the slight but constant overemphasis of Russia's present and past achievements in this field. This should, however, not interfere with this booklet's usefulness and acceptance by those who are interested in a Russian description of the substances which inhibit growth and development of microorganisms.

Paul H. Glucksman

DER VOLKS-BROCKHAUS (THE PEOPLE'S BROCKHAUS ENCYCLOPEDIA)

By the editorial staff of Brockhaus' encyclopedias. Twelfth revised edition. 896 pages with 3,550 illustrations. Index. DM. 18. Wiesbaden, Germany, F. A. Brockhaus, 1956.

In the past, Germany was Europe's leading country in the quality and quantity of lexicographic works published. The influence of the Nazis, the scarcity of scientists, editors and printers during World War II and the general financial condition of German publishing in the first postwar period have left their marks on German encyclopedic research. Slowly but thoroughly, however, this gap is being filled.

Besides the *Small Brockhaus,* which reappeared in 1949-1950, and the *Great Brockhaus,* a 12 volume encyclopedia which will be completed in 1956 (and which will be reviewed at a later date), the twelfth edition of the *People's Brockhaus* now makes its bow. It is a rather small but authoritative reference book, and its information covers all fields of human endeavor. A skilled and experienced editorial staff and many German and international contributors have made this one volume reference work a valuable source of many fascinating bits of information.

The book fulfills the purpose for which it was intended. Its binding, format and printing are excellent. More than 40,000 alphabetical entries make this small encyclopedia a valuable addition to the library of all who are able to read German.

Except for a few entries, which obviously were written to satisfy German national pride, this work will be useful to its readers in the United States.

Paul H. Glucksman

DIE ZAHNKARIES UND IHRE SOZIALHYGIENISCHE BEDEUTUNG (DENTAL CARIES, ITS IMPORTANCE FOR PUBLIC DENTAL HEALTH)

By Prof. Wolfgang Rosenthal and Prof. Walter Hoffmann-Axthelm. 102 pages with 60 illustrations. Index. DM. 34. Berlin, VEB Verlag Volk und Gesundheit, 1955.

This book consists of speeches made at the last session of the German Academy of Sciences held in May 1955 at Berlin. The papers were written by leaders of the public dental health services of Denmark, Germany, Hungary and Switzerland. Eleven papers are presented, each followed by a discussion. Recent references are included in a bibliography at the end of each lecture.

Several of the papers are illustrated with black and white photographs, drawings and diagrams, and some with multicolored photomicrographs. Generally, the illustrations are of an excellent quality, and the diagrams are clear and concise. Treatment of the theoretical and practical aspects of every subject is well balanced.

Both successful technics and those proved to be fruitless are pointed out. Fluoridation of drinking water is recommended as the only

effective caries prophylaxis known by German, Hungarian and Swiss authors.

This book is excellently printed, has but a few typographical errors, and is well bound in cloth. The paper is of fine quality. The language (even that of the translations from Danish, French and Hungarian into German) is clear, simple and easily understood. Every dentist who is interested in the public dental health, and especially in fluoridation, should have this book in his library.

Paul H. Glucksman

GRUNDRISS DER PHARMAKOLOGIE FÜR ZAHNÄRZTE UND FÜR STUDIERENDE DER ZAHNHEILKUNDE (PHARMACOLOGIC OUTLINE FOR DENTISTS AND DENTAL STUDENTS)

By Prof. T. Gordonoff. 308 pages with 26 illustrations. Index. 22 Swiss Francs. Basel, Benno Schwabe & Co., 1956.

Although in the United States as well as in many European countries, several authoritative textbooks on both dental and medical pharmacology are available, an up-to-date and interpretative work of the type that Gordonoff and his Swiss collaborators have prepared fulfills a long-standing need.

This book, written for both practicing dentists and dental students, represents the joint effort of many pharmacologists and dentists whose combined clinical and laboratory experience provides a balanced presentation of facts and theories. All chapters—general and special pharmacology, local anesthetics, the vegetative nervous system, analeptics, dilatation of the vessels, disinfection and disinfectants, chemotherapeutics and antibiotics—are of such high standard that they can satisfy the discriminating specialist and be attractive also to dentists and dental students who have a limited background in pharmacology.

The author has kept to a minimum the literary excursions into and quotations from already known material. Relatively new phases of pharmacology are as adequately presented as are the more familiar subjects. The text is written in an excellent and easily comprehensible German and is free from typographical errors. The book is well bound, printed and illustrated, and can be recommended to dentists and dental students who desire authoritative and current information on Swiss, Austrian, German and international pharmacology in dentistry.

Paul H. Glucksman

BETTLARÄ OCH BETTANALYS (THEORY OF OCCLUSION AND BITE-ANALYSIS)

By Ulf Posselt. 189 pages with 83 figures. Price not listed. Copenhagen, Dansk Videnskabs Forlag A/S, 1955.

This book on occlusion in adults is intended to be used as a textbook for undergraduate dental students in a specific course on occlusion which is offered at the Swedish dental schools early in the dental curriculum.

By far the best and most interesting part of the book is concerned with the kinematics of the mandible. Dr. Posselt is an established authority in this field, and interested readers are referred to his excellent monograph, *Studies in the Mobility of the Human Mandible* (Copenhagen, 1952).

The significance and the effect on the periodontium of traumatic occlusion are discussed briefly. Mounting of models in an individually adjustable articulator is described in detail, and subsequent analysis of occlusal relations is recommended according to Lindblom and Beyron's principles. In traumatic temporomandibular joint arthritis, roentgenograms should be used for evidence of displacement of the condyle and for occlusal reconstruction.

Procedures for occlusal adjustment, treatment of temporomandibular joint arthritis and use of splinting procedures as part of periodontal therapy are outlined briefly. The numerous illustrations are reproduced fairly well. The author obviously does not attempt to cover the entire field of occlusion, but the book is highly recommended as an introduction into this confusing field.

Sigurd Ramfjord

Current Literature

DENTAL EXTRACTION DURING DICUMAROL THERAPY

John Martin Askey and Clifford B. Cherry. California Med. 84:16 Jan. 1956.

When patients are receiving long term antithrombotic therapy with bishydroxycoumarin (Dicumarol), a potent anticoagulant, they are commonly warned against the hazards of prothrombin reduction, including the danger of hemorrhage after dental extraction.

Failure to instruct one patient resulted in an experience which may revise opinion on this matter. The patient mentioned that he had had several teeth extracted recently. The dentist, surprised to learn that the patient had been taking bishydroxycoumarin, reported there had been no unusual bleeding.

A second patient required dental extractions, but the oral surgeon was loath to extract the teeth unless the patient discontinued antithrombotic therapy which had been started three years earlier after a cerebral thrombosis with hemiplegia.

The patient pleaded his own case well in a letter to the oral surgeon: ". . . If I desist from taking Dicumarol for four days there is the possibility that I might have another thrombosis. If I do take it, there is another possibility (which I personally think is somewhat less) of excessive bleeding from the extraction. . . . It is my deliberate desire and deliberate wish to take the second risk. . . ."

Three teeth were extracted without unusual bleeding, and a fourth was extracted later. After these two experiences, antithrombotic therapy was continued through dental extractions with other patients. Six patients in the medical care of the authors have had 14 extractions. The average age of these patients was over 65 years. The results indicate that the risk of bleeding from dental extraction during bishydroxycoumarin therapy is much less than has been suspected.

This can be explained reasonably. In external surface bleeding, pressure can be applied and tissue juice is available as a source of thromboplastin; therefore the bleeding usually is easily stopped.

This report should not be construed as evidence that there is no need ever to discontinue bishydroxycoumarin therapy for dental extractions. The prothrombin deficiency presumably could lead to serious bleeding, although no instances have been reported.

Most patients can safely discontinue the antithrombotic therapy for four days. Each patient must be evaluated in an attempt to identify those who are likely to have thrombosis if the drug is stopped. If such patients require dental extraction, the risk of bleeding is much less than the risk of thrombosis. Should hemorrhage occur, available K_1 preparations can produce a rapid rise in prothrombin activity.

CONSIDERATIONS IN DIAGNOSIS OF MAXILLARY FRACTURES

Theodore A. Lesney. J. Oral Surg. 14:137 April 1956.

Anatomic considerations indicate that bilateral fractures of the maxillae, resulting in detachment of these bones from their cranial base, are not solitary clinical entities. Other buttressing bones of the face and skull are invariably involved in such injury. One of these major buttresses, the pterygoid plates of the sphenoid bone, is singled out as being likely to have a concomitant, though often unnoticed, injury. The oral surgeon, if he is the responsible doctor, is alerted toward providing the means for ascertaining the full extent of injury. Some neurological signs of intracranial injury, such as might be suspected in extreme maxillary fractures, are reviewed.

CIRCUMSCRIBED HYSTERIC AMNESIA ASSOCIATED WITH ORAL SURGERY AND GENERAL ANESTHESIA; DISCUSSION AND REPORT OF CASE

Frank M. McCarthy, Van M. Graves and Adrian O. Hubbell. J. Oral Surg. 14:159 April 1956.

Amnesia associated with surgical procedures and general anesthesia is rare. A review of the literature reveals no other cases similar to the one reported herein.

A white woman, 54 years of age, came for an extraction. The routine preanesthetic history was essentially negative. Examination was not unusual, although the surgeon noted incidentally that the patient was overbearing to the point of antagonism.

Under intravenous thiopental sodium anes-

thesia (12 cc. of 2.5 per cent solution), the tooth was extracted without incident. Upon emergence, the patient asked, "Where am I? What am I doing here?" Examination revealed total loss of memory for all the events of that day.

On the first postoperative day, the patient remembered all events up until shortly before the venipuncture, but she remembered nothing thereafter until awakened that morning. The amnesia narrowed to a four hour period by the eighth postoperative day.

During all postoperative examinations, the patient was most antagonistic and kept up a constant stream of complaints.

A later more complete history revealed frequent migraine headaches which had necessitated 11 hospitalizations. It was claimed that only chiropractic manipulations gave relief. Three of eight siblings suffer from migraine headache. She stated that she had an "emotional disturbance" and "psychic" chest pains after her husband's death from coronary occlusion one and a half years earlier.

It is felt that the patient has suffered for years from moderately severe anxiety hysteria, with evidence of previous somatic and anxiety symptoms. The emotional demands attendant on the oral surgery and general anesthesia were too much for her to tolerate, and she developed amnesia as a result, thus rejecting the experience from her consciousness.

THE DIAGNOSIS AND CORRECTION OF FUNCTIONAL MALOCCLUSION

Blair C. Madsen. New York J. D. 26:5 Jan. 1956.

Study of the history of man reveals that nature designed a masticating mechanism intended to function efficiently with multiple and balancing cusp contacts. This precise function was intended to exist not only in hinge axis closure, but in right and left lateral and protrusive movements of the mandible.

When premature contacts existing on certain teeth interfere with simultaneous contact of all teeth in hinge axis closure or when locked cusps and incisal overbite prevent the normal function of bilateral balance in all masticatory ranges, the condition is known as functional malocclusion. Functional malocclusion is one of the chief causes of periodontal disease, temporomandibular dysfunction and destruction of arch form.

A technic is described for the diagnosis and correction of functional malocclusion. The destructive effects can now be greatly minimized by occlusal equilibration.

Prosthetic counterpoise is the addition of an equivalent power or force which will act in opposition to a force which is destructive to any part of the masticatory mechanism. This principle can be used in treatment of patients with a deep vertical overlap. A technic is described which is designed to provide posterior balancing support for the relief of trauma imposed on the incisor teeth during incisive function. Most attempts toward relief of trauma have been in the form of increasing the vertical dimension, such as occlusal reconstruction, bite plates and splints.

In patients with a moderately deep vertical overlap where the curve of Spee is fairly normal, increasing the vertical dimension is not only unnecessary but in many instances should be avoided.

COMPARISON OF BALANCED AND NONBALANCED OCCLUSION OF ARTIFICIAL DENTURES BASED UPON DISTRIBUTION OF MASTICATORY FORCE

Arthur R. Frechette. J. Pros. Den. 5:801 Nov. 1955.

A comparison of the function of complete dentures with balanced and with nonbalanced occlusion was made by utilizing electronic testing equipment to measure deflection caused by pressure during the act of chewing salted peanuts.

SR-4 type strain gauges were secured to six isolated regions of the upper denture base on a line projected between the first molars. These regions were located in the buccal flange, ridge crest and palatal slope of each side. The gauges were connected to Wheatstone bridge circuits with suitable amplifiers and oscillographs to record the deflections produced by the pressure of the denture against the mucosa.

Denture sections, which employed 30 degree Pilkington-Turner posterior teeth, were attached to upper and lower cast metal bases. The guiding inclines of the teeth were balanced to harmonize with the patient's condylar paths and the desired incisal guidances.

Three Gm. portions of salted peanuts were chewed, 30 strokes for each recording. This procedure was followed to produce five records of bilateral chewing and was repeated for unilateral chewing on the left side and unilateral chewing on the right side. The entire procedure was carried out on three consecutive days to give a total of 15 records of each type of chewing with the teeth in balanced occlusion.

On completion of the recordings with the dentition in balanced occlusion, the dentures were returned to the articulator for reduction of certain cuspal inclines to produce a nonbalanced occlusion. Then the dentures were reinserted in the patient's mouth for repetition of the chewing and recording procedures.

In the studies conducted, the advantages of balanced occlusion did not appear to be established. The recordings indicate that bilateral chewing contributed much more to denture stability than did balanced occlusion.

Joe P. Lambert

AN ANALYSIS OF CURRENT CONCEPTS OF OCCLUSION

Vincent R. Trapozzano. J. Pros. Den. 5:764 Nov. 1955.

The role played by occlusion in the function of the stomatologic system has aroused widespread interest. The recent increase in the number of publications dealing with occlusion makes it necessary for terms to be defined.

Centric relation may be defined as follows: "Centric relation is the most retruded unstrained position of the condyles in the glenoid fossae at any given degree of jaw separation from which lateral movements can be made."

For analysis, the definition may be broken up into three parts: (1) "It is the most retruded, unstrained position of the condyles in the glenoid fossae . . ." Since the individual can assume this most retruded position voluntarily by the action of his mandibular musculature, the position is, of course, unstrained. (2) ". . . at any given degree of jaw separation . . ." Centric relation can be recorded in any vertical position of the mandible from one of extreme overclosure to one of overopening. (3) ". . . from which lateral movements can be made." No lateral movement can be made when the mandible is opened to its greatest extent or from a "forced" retrusion.

ADAPTATION AND THE HYBRID-PROSTHESIS

Niels Brill. J. Pros. Den. 5:811 Nov. 1955.

The dental prostheses discussed are constructed according to the principles governing the shapes and functions of ordinary complete dentures except that the hybrid dentures owe most of their retention to one or more of the natural teeth.

These hybrid prostheses are of great value when it is difficult or impossible to obtain satisfactory retention by means of dentures of the conventional type.

Hybrid dentures are utilized only when it is deemed absolutely essential because of abnormal ridges, muscular attachments or phonetic problems.

Retention is achieved by utilizing the remaining natural teeth, either as they are, or by preparing them in the described manner. The denture is equipped with the B & C adapter which serves as a clasp or retainer.

Consideration is given to the physiologic condition of the remaining natural teeth, their tissue attachments and periodontal attachments. The stresses placed on these teeth determine the degree of preparation and the type of replacement on these abutments. The technical procedure is described and illustrated.

This type of prosthesis has great value in extremely abnormal conditions and serves to rehabilitate many patients who could otherwise never be served satisfactorily.

W. H. Meyer

INFLUENCE OF HEREDITY IN THE ETIOLOGY OF MALOCCLUSION

Kathryn F. Stein, Ph.D., Thomas J. Kelley, D.D.S., M.S., and Eunice Wood, M.A. Am. J. Orthodont. 42:125 Feb. 1956.

Malocclusion of the teeth and jaws has been said to be the most common structural defect in man. Volumes have been written concerning its etiology, the larger proportion dealing with environmental factors such as sucking habits, pressures (both intrauterine and those due to sleeping positions), mouth breathing, loss and retention of teeth, endocrine imbalance and nutritional deficiencies. A considerable section of the literature, however, has been devoted to attempts to discover the influence of hereditary factors, and many writers have emphasized the importance of consideration of such factors in the treatment of the various conditions involved.

In this study 275 persons were interviewed, and the data were compiled.

Lateral cephalometric roentgenograms of all persons were made with a Ritter x-ray machine and with the patient held securely in a Margolis cephalostat. Observations were as follows:

1. Statistical correlation studies of facial angles measured from lateral roentgenograms

taken with the use of a Margolis cephalostat indicate significant positive correlation in several instances. The angle formed by the palatine plane relative to the upper part of the face shows the highest degree of correlation. The correlation of facial angles is particularly high between sisters.

2. Superimposition of tracings from roentgenograms shows likenesses between related persons, likenesses especially striking in three pairs of identical twins.

3. Family pedigrees indicate that similar types of occlusion occur in families and that Angle's Class II occlusion may be the result of recessive factors.

4. Students with malocclusion had a higher percentage of relatives (siblings and parents) with malocclusion than those with normal bite.

5. No conclusive evidence was found for the influence of any particular environmental factor, such as sucking habits, for the causation of malocclusion.

William F. Ford

DIAGNOSIS AND TREATMENT WITH OCCIPITAL ANCHORAGE

Walter H. Mosmann, D.D.S. Am. J. Orthodont. 42:112 Feb. 1956.

The exclusive use of occipital anchorage in carefully selected patients will bring satisfactory results in the following conditions:

1. Instances of Class II malocclusion with the maxillary incisors either protruding, retruding or crowded.

2. When the mandible is in such relationship to cranial anatomy that the mandibular plane, if extended posteriorly, intersects or falls below the occipital bone. There must be excellent alignment of mandibular teeth or else ample space for them to erupt into good alignment. There may be an excessive curve of Spee and there may be slight spacings, but there should be no rotations or overlapping of contacts. The incisor-mandibular angle should not exceed 95 degrees.

3. Where there is active facial growth during treatment, such growth is essential. Patients are started just prior to the accelerated growth period which frequently occurs in girls around ten and in boys around 11 years of age. These are only approximate ages and depend on the physical development of the child.

Occipital anchorage obtains important results. Headcap treatment strongly retards the forward movement of the maxillary teeth, despite the manifestation of active dentofacial growth. Mandibular teeth are carried forward into Class I relationship during headcap treatment as the mandible grows forward and downward. Distal movement of maxillary molars is extremely rare, having been noted in only two out of approximately 50 patients; the distal movement in these instances was less than 1 mm. This lack of distal movement was noted in the comparison of the "before and after" cephalometric tracings.

Success with this technic depends on differential diagnosis, facial growth, patient cooperation and an efficient headcap.

William F. Ford

THE EARLY EXPANSION OF DECIDUOUS ARCHES AND ITS EFFECT ON THE DEVELOPING PERMANENT DENTITION

Richard E. Barnes, D.D.S. Am. J. Orthodont. 42:83 Feb. 1956.

By early expansion of the deciduous arches, many malocclusions can be prevented that otherwise would result in severe crowding of the anterior teeth.

Early treatment is not a panacea for all orthodontic crowding, but in a high percentage of cases where obvious anterior crowding will be present, prevention may be expected.

The success of early expansion of the deciduous arches is dependent on the availability of unabsorbed deciduous abutment teeth, and for the most successful expansion results, treatment is started in the second most active growth period, from four to seven years of age. The training of the musculature about and in the oral cavity probably has as much bearing on the success of early expansion as does any repositioning of the permanent developing teeth.

Treatment may be contraindicated when certain permanent teeth are missing (as maxillary or mandibular incisors or bicuspids), where obvious bimaxillary protrusion exists, where ankylosed deciduous molars are present and where the deciduous cuspids have started to absorb.

William F. Ford

SOME INDICATIONS OF THE EARLY CAUSES OF MALOCCLUSIONS

R. R. McIntyre. J. Canad. D. A. 22:69 Feb. 1956.

Dentists in general practice most often see children at an early age and so have an opportunity to recognize environmental factors that tend to produce malocclusion. The ideal deciduous dentition by age five will have the distal borders of the deciduous second molars

in a vertical relationship, and all of the teeth will show considerable wear, especially the cuspids. This wear permits the lower jaw to move forward so that the incisors are edge to edge, and the distal surfaces of the deciduous second molars now allow the permanent first molars to erupt into proper occlusal relations.

When this wear does not occur, the dentist may grind high cusps to achieve artificially the desired natural wear and freedom of mandibular movement. Some protrusive relations of the lower arch to the upper arch are the result of interfering tooth surfaces which produce an accommodation bite. Removal of these interferences often allows improvement in arch relations and reduces the likelihood of establishment of unfavorable muscle patterns.

Early recognition of missing teeth, supernumerary teeth, ectopic eruption and other dental anomalies requires frequent use and wise interpretation of roentgenograms. In some instances, special care to save a deciduous tooth, extraction of a supernumerary, or use of a separating wire or band to guide an erupting tooth will obviate later and more serious problems. In addition, inhibition of unfavorable tongue, lip, and finger activities may permit resumption of satisfactory developmental progress.

Thomas D. Speidel

HEMORRHAGIC FEVERS: ESPECIALLY THE KOREAN TYPE (DIE HÄMORRHAGISCHEN FIEBER: UNTER BESONDERER BERÜCKSICHTIGUNG DES IN KOREA AUFTRETENDEN HÄMORRHAGISCHEN FIEBERS)

W. D. Germer. Deut. med. Wschr. 80: 1717 Nov. 25, 1955.

In epidemiology, the fact is well established that the frequency and distribution of many infectious diseases follow geographic lines. When instances of these diseases are pinpointed on a map, new relationships appear, and several provocative questions arise. Paradoxes emerge, requiring further intensive studies.

The Korean hemorrhagic fever which suddenly attacked more than 2,000 United Nations soldiers is similar to but not identical with other known forms of this disease. These epidemic hemorrhagic fevers are classified according to their appearance in geographic areas as follows:

1. Hemorrhagic fever of Uzbekistan, U.S.S.R., is caused by a dermotropic virus, affecting the skin and the mucous membrane. The vector is *Hyalomma anatolicum,* and the transmitters probably are cattle. The main contagion period is between June and July. The death rate amounts to about 30 per cent. The main characteristics are oral and gastrointestinal hemorrhages.

2. Hemorrhagic fever of Crimea, U.S.S.R., is also caused by a dermotropic virus. The vector is *Hyalomma marginatum;* transmitters are ticks, rabbits and probably birds. The contagion period is summer. The death rate is but 3 per cent. The characteristics are oral and gastrointestinal hemorrhages which are not as severe as those occurring in the hemorrhagic fever of Uzbekistan.

3. Hemorrhagic fever of the Far East is caused by unknown factors; a possible vector is trombicula (acarine mite); the probable transmitter is *Apodemus agrarius.* Contagion occurs mainly during spring and fall. The death rate varies from 5 to 15 per cent, and the characteristics are hemorrhages in the oral cavity and in the region of the kidneys.

4. In hemorrhagic fever of northern Scandinavia *(neophropathia epidemica),* neither the causative factor nor the vector is known; suspected transmitters are mice and rats. Contagion occurs during winter. The disease is not lethal, and its characteristics are atypical pneumonia and lymphadenopathy.

5. Hemorrhagic fever of Omsk, U.S.S.R., is caused by viruses of unknown types; the vector is *Dermacentor pictus* (a type of tick); the transmitters are, besides ticks, *Microtus gregalis* and probably cattle; the incubation time ranges from May to August. The death rate varies from 1 to 40 per cent, and the characteristics are pneumonia and lymphadenopathy.

6. The Korean hemorrhagic fever is a variation of the disease, appearing in countries of the Far East. Clinically, it has a characteristic onset, course and physiologic alterations. The outbreak is seasonal, with peaks in spring and fall. The causative virus has not been identified. Mites are transmitters, and the Manchurian field mouse forms the animal reservoir. Typically, there are five different stages of this disease: an incubation period (from 14 to 21 days); a febrile phase (from 3 to 5 days) characterized by a sudden onset of chills and high fever, malaise, headaches, nausea and vomiting and petechial bleeding; a third stage (from 5 to 9 days) in which shocks, proteinuria, hematuria, leukocytosis and thrombocytopenia appear; a fourth stage (from 9 to 13 days) marked by oliguria, anuria, and severe hemorrhages in the oral cavity; a fifth phase (from 13 to 21 days), in which the face and the conjunctiva become hyperemic, and diuresis appears.

The mortality rate varies from 5 to 15 per

cent, one third of the fatalities occurring during the third stage.

Autopsies performed on 18 patients revealed that severe shocks, renal insufficiency and widespread hyperemia were the usual causes of death. Typical autopsic findings were hemorrhages in all organs, characteristically into the hypophysis, renal parenchyma and the right atrial wall of the heart; edema may be pronounced in retroperitoneal tissue and the peritoneum. Necrosis may occur in the pituitary gland and the kidney, but the renal lesion usually is a tubular degeneration.

SELF-POLYMERIZING ACRYLIC FILLINGS

M. M. Weinreb and L. Hirsch. Internat. D. J. 5:377 Sept. 1955.

An extensive review of the chemical, physical and biologic properties of the self-curing acrylic filling materials is presented. The knowledge of these properties will enable the dentist to use the materials intelligently and judiciously, thus adding a useful item to his armamentarium.

Until recently, the polymerization of the self-curing acrylic resins (the methyl methacrylates) was based on a benzoyl peroxide-tertiary amine activated system. Such a system develops discolorations in the restoration from light yellow to deep brown because of the action of benzoyl peroxide on the tertiary amines and on hydroquinone (the inhibitor present in the monomer).

Currently, in some of the marketed brands of the self-polymerizing acrylic filling materials, the benzoyl peroxide has been replaced by sulfurous compounds, either p. toluene sulfinic acid or lauryl mercaptan. Such agents do not require the services of an activator, such as the tertiary amines, nor do they oxidize the ever-present hydroquinone in the monomer. Thus, good color stability is realized with those self-polymerizing acrylic filling materials in which these agents are present.

With respect to physical properties, these materials show certain shortcomings: volumetric shrinkage during polymerization, which can be partly compensated for by imbibition of water; a polymerization not as complete as that for the heat-cured acrylic resins; low hardness values; low modulus of elasticity, and high coefficient of thermal expansion. However, very favorable low values are noted for two physical properties: degree of solubility and thermal conductivity.

In order to ascertain the suitability of these resins as filling materials, they are rated according to the extent to which they meet the known specifications of a satisfactory filling material. These resins adequately fulfill the requirements of four of the specifications: (1) indestructibility in the fluids of the mouth; (2) color or esthetics (the newer resins are especially good in this respect); (3) low thermal conductivity, and (4) convenience of manipulation.

These filling materials appear to manifest varying degrees of failure in the other requirements, as follows:

1. There seems to be no doubt that they can and do irritate the dental pulp when a suitable cavity liner is not used.

2. With respect to adaptability to cavity walls, it has been suggested that the self-curing acrylic resins do not seal cavities well because of their excessive shrinkage during polymerization and their high coefficient of thermal expansion. Nevertheless, it must be emphasized that with the use of proper insertion methods, tightly fitting acrylic fillings can be produced.

3. Since they lack freedom from dimensional change after placement in the cavity because of their inherent shrinkage during polymerization, technics must be used to compensate somewhat for the shrinkage or to direct it, technics such as the modified insertion methods (Nealon brush and stratified polymerization technics) and the use of cavity seals and primers.

4. They do not exhibit much resistance to attrition and lack capacity to withstand the forces of mastication. Consequently, it would be wise to avoid their use in all stress-bearing regions.

In spite of many deficiencies, these materials seem to have earned a definite place in the practice of dentistry. If used with care in their indicated situations, they promise to be a valuable addition to the dentist's armamentarium.

Erbert W. D'Anton

THE REMOVAL OF DENTAL CALCULUS BY INSTRUMENTS AND BY OTHER METHODS

J. Kluczka. Internat. D. J. 5:355 Sept. 1955.

The formation of dental calculus occurs through the diffusion of mineral material into or deposition of mineral material on a coagulum of organic material. The viscosity of the saliva is of some importance. Other factors, such as general health, may influence the rate of formation of dental calculus.

The elimination of calculus may be therapeutic or prophylactic. Prophylactic removal concerns essentially the supragingival incrusta-

tions. The therapeutic removal of dental calculus is essential in the treatment of periodontal disease. In the therapeutic removal of dental calculus it is advisable to treat only one group of teeth during one session. Aids to the sense of touch in locating subgingival calculus are the roentgenogram, the intraoral electric lamp, Talbot's disclosing solution and the packing of pockets for better visibility. Immobilization of loose teeth may be effected by means of temporary splints which leave the operating field clear and the gingiva without irritation.

There are four basic types of instruments for the removal of dental calculus: (1) chisels and lancets, (2) hoes and sickles, (3) files, (4) curets. Satisfactory automatic instruments or drills have not been developed as yet. Two ways of holding an instrument are: (1) like a pen, and (2) in the fist; all other positions are only varieties of these basic positions. The chisel, used for pushing movements, is needed for the removal of hard deposits from the proximal sides of the teeth. Calculus may be removed from deep pockets with hooks and sickles provided the working end of the tool corresponds with the anatomic form of the roots and is small enough. Widely curved sickles are useful for the removal of supragingival deposits. Files are indispensable for subgingival curettage. Sharp curets are used to remove deeply deposited calculus, infected cementum, granulations and epithelium proliferations. It is essential for the complete removal of dental calculus to use only the sharpest instruments.

A number of chemical remedies to dissolve or loosen dental calculus have been invented. Since the substance of the teeth has the same chemical composition as the calculus, however, all substances affecting the deposits must also destroy the teeth. In preventing dental calculus, thorough cleaning and removal of soft deposits is of great value. The removal of calculus must be followed by polishing.

Ben C. McKinney

PSYCHOLOGICAL FACTORS IN ANESTHESIA

E. E. Hamilton, D.D.S., and Virginia Hamilton Trexler, D.D.S. Internat. J. Anesth. 3:13 Jan. 1956.

Fear or anxiety on the part of the patient is one of the major obstacles to be overcome in the administration of pleasant, safe and uneventful anesthesia.

To dispel anxiety, the operator should be able to inspire his patient's confidence, since a patient can usually sense the doctor's feelings. This means that the operator must himself feel confident of his ability to perform the operation successfully.

In choosing an anesthetic, the patient's feelings should be a deciding factor if there are no contraindications to his choice.

When general anesthesia is chosen, the induction should be carried out in a cautious and gentle manner, for if this step is poorly managed, the patient may rebel. For a child or nervous adult, the anesthetist should not allow the inhaler to touch the face until the patient becomes a little drowsy from the gas; the patient should then be carried into the surgical stage of anesthesia. Struggling is usually caused by a smothering sensation brought about by too rapid induction.

Bystanders, even in short oral surgical operations, usually should not be permitted to watch.

When local anesthesia is the choice, the patient can usually be convinced that anesthesia is present if the operator tests for "pain" and "pressure" on the mucous membrane of both anesthetized and unanesthetized areas of the mouth.

Virginia Hamilton Trexler

PREMEDICATION FOR GENERAL ANESTHESIA ADMINISTERED IN THE DENTAL OFFICE

Martin H. Blitzer. Internat. J. Anesth. 3:6 Jan. 1956.

Adequate premedication for general anesthesia in the dental office has always been a problem. In this study, a number of preparations were used to determine which more nearly possess the properties of an ideal premedicant. Results for each agent or combination were evaluated as "poor," "good" and "excellent." Preanesthetic fear and anxiety, reaction to the power of suggestion, induction and maintenance, heart rate, blood pressure, mucus formation, postanesthetic nausea and vomiting, awakening time and the ambulatory state of the patient were the factors that governed the evaluation. Agents tested were: (1) dimenhydrinate (Dramamine), (2) pentobarbital (Nembutal) and belladonna, (3) methantheline bromide (Banthine), (4) dicyclomine hydrochloride (Bentyl Hydrochloride), (5) Dactil, (6) butabarbital sodium (Butisol Sodium), (7) Algoson, (8) butabarbital sodium and Dactil, (9) chlorpromazine hydrochloride (Thorazine), (10) phenobarbital, (11) Dactil and phenobarbital and (12) pentobarbital.

Weaker anesthetic agents, such as nitrous oxide, require heavier premedication than the more potent ones, such as cyclopropane, vinyl

ether (Vinethine), and ether. Each agent, or combination, had 25 trials. The study of the most promising combination, Dactil and butabarbital sodium, was amplified to 300. Dactil is an anticholinergenic drug which exhibits postganglionic, parasympathetic depressive action. It is a potent antispasmodic, slightly antisecretory and antihistaminic, essentially nontoxic and free of side effects. The rationale of Dactil's use is based on its action in blocking the acetylcholine at the smooth muscle neuromyal junction but not at the ganglionic level. There is definite but mild musculoskeletal "curarelike" relaxation. Butabarbital sodium is an intermediate barbiturate, generally safe in most renal, vascular and gastrointestinal disorders. Of the agents tested, Dactil and butabarbital sodium seemed effective enough to warrant further study.

INFECTIOUS MONONUCLEOSIS RADICULONEURITIS AND POSTERIOR LARYNGEAL PARESIS (MONONUNKLEOSE, GUILLAIN-BARRÉ SYNDROM UND POSTIKUSPARESE)

S. Rauch. Deut. med. Wschr. 80:1767 Dec. 2, 1955.

Infectious mononucleosis is a generalized virus infection, characterized by sudden onset and acute course, with high fever and inflammatory swelling of the lymph nodes. The oral cavity and the nasopharynx are the most likely ports of entry. Young men and boys are most frequently affected. Usually, this disease is accompanied by leukocytosis caused by abnormally large numbers of mononuclear leukocytes. In contrast to other related diseases, the bone marrow shows no alteration. The Paul-Bunnell test, to establish the presence of heterophil antibodies, will be positive in 60 to 70 per cent of patients.

Infectious mononucleosis usually follows a benign course, but besides the respiratory, pulmonary and cardiovascular systems, the central nervous system also may be involved. Neurologic complications can be expected in 2 per cent of the instances. Paralysis, especially of the cranial nerve, occurs frequently, and the cerebrospinal fluid examination will reveal the presence of the symptomatic complex of radiculoneuritis (Guillain-Barré syndrome).

Case 1. The patient, a six and a half year old boy, had laryngeal paralysis necessitating immediate tracheotomy. Polyradiculomeningitis and right facial paralysis were the outstanding neurologic findings. Daily injections of 500,000 units of penicillin were administered.

During this treatment severe speech defects appeared, and eating and swallowing became impossible. The Paul-Bunnell test of the blood was positive but that of the fluid negative. The submandibular lymph node was inflamed and swollen. No spinal paresis was observed. After a treatment lasting for more than two months, complete recovery was obtained.

Case 2. The patient, a five year old boy, returning from Africa to Europe, suffered bilateral posterior laryngeal muscle paralysis causing severe respiratory difficulties. The primary therapy, directed toward malaria, consisted in pamaquine naphthoate (0.02 Gm. orally per day) and quinine dihydrochloride (intravenously); it obtained no improvement.

Dysphagia and dysphonia appeared, and a renewed examination led to a change in diagnosis: infectious mononucleosis, accompanied by radiculoneuritis and posterior laryngeal paresis. The therapy now consisted of oxytetracycline (tablets) and an administration of vitamin B complex for about seven weeks. The laryngeal stridor, however, remained unchanged. Tracheotomy and a surgical widening of the glottis were performed. The patient still undergoes treatment.

A constant observation in infectious mononucleosis is febrile lymphadenopathy. Tuberculosis, leptospirosis, and various other virus infections must be considered in differential diagnosis. In instances of facial paralysis, poliomyelitis can be ruled out. Treatment with oxytetracycline and erythromycin has shown promise.

PATHOLOGY AND THERAPY OF ANGIOMAS (ZUR PATHOLOGIE UND THERAPIE DER ANGIOME)

U. W. Schnyder. Schweiz. med. Wschr. 85:1081 Oct. 29, 1955.

Angiomas are morbid enlargements in which the involved cells tend to form blood or lymph vessels. Usually the prefix indicates the kind of tumorous lesion, as in hemangioma or lymphangioma. When the condition is congenital, the term hamartoma is used, but when it occurs in the patient's later life, it is called angiosarcoma.

Clinically, angiomas are classified as hemangioma (capillary, cavernous, plexiform and sclerosing hemangioma), hemangio-endothelioma, glomangioma and hemangiopericytoma; lymphangioma (lymphoma); chordoma; myoma (leiomyoma, fibromyoma, rhabadomyoma, myoblastoma); glioma (neuroglioma, neuroma); mesothelioma; perithelioma and giant cell tumor.

Most of the angiomas have been described

as syndromes and include unilateral varicosis, arteriovenous anastomosis, glaucoma, angiomatosis of the meninges and nevoid amentia.

Histologically, angiomas are characterized by the lack of proliferative vascularization. In newborn and young children, neither an increase nor a dilatation of vessels will be observed. In adults, however, an increasing vascular ectasia occurs, which reaches the subpapillary and cutaneous capillaries.

These neoplasms usually do not respond to radiation. An insignificant amount of fading can be achieved, but the esthetic result is unsatisfactory. In instances of small circumscribed hemangiomas, dry ice will obtain improvement (contact time from 10 to 15 seconds). Verdier and Schreuss recommend surgical opening of the nevus and cauterization.

In the majority of patients, a slow retrogression takes place; in others, the neoplasm becomes stable after a distinct developmental period. Only in a few instances does the true angioma develop progressively. A spontaneous evolution of planotuberous angiomas often leads to complete recovery. Tuberous angiomas, however, leave scars after recession and spotty angiomatous remains.

Therapy consists in short distance, low voltage roentgenotherapy and surgical excision. Angiomas, latent for years, usually react unfavorably to roentgenotherapy. Improvement can be achieved by applications of a solution containing quinine and urethane or by freezing with dry ice, if, for esthetic, topographic or functional reason, surgery is contraindicated.

SJÖGREN'S SYNDROME
(DAS SJOEGREN-SYNDROM)

Ernst Lyon. Med. Klin. 51:131 Jan. 1956.

In keratoconjunctivitis sicca, characteristic symptoms appear such as hyperemia of the conjunctiva, lacrimal deficiency, thickening of the corneal epithelium, itching and burning of the eyes and reduced visual acuity. Additional phenomena such as progressive insufficiency and atrophy of salivary and oral mucous glands and a constant dryness of the mucous membrane often can be observed.

Sjögren, a Swedish physician (1859-1939), examined the set of symptoms which usually occur simultaneously. This symptom complex now is known as Sjögren's syndrome. Sjögren emphasized that alterations occurring in the mucous membrane are only a part of this syndrome and that there are similarities between the phenomena appearing in keratoconjunctivitis and those occurring in rheumatic (chronic infectious) arthritis.

Sjögren's syndrome is observed more frequently in women than in men and in older patients oftener than in younger people. The probable causative factors are different types of infections, hypervitaminoses, endocrine insufficiencies, disturbances of the vegetative nervous system and allergies of various kinds.

The dentist should recognize such phenomena as alterations in the mucous membrane, inadequate salivation, burning and itching of the tongue, pain in the soft tissues of the mouth and temporary or permanent swelling of the salivary glands. The teeth often are friable, caries is frequent, and loss of teeth (seemingly without determinable cause) occurs.

There are as many etiologic explanations for Sjögren's syndrome as there are authors reporting this symptom complex in dental and medical literature. Because the high point of frequency seems to occur in women in or near their climacterium, disturbances in the hormonal metabolism or in the vegetative nervous system are suspected to be causative factors.

Prolonged malnutrition, deficiency of vitamins, iron or enzymes and an insufficiency of cell catalyzers were added to the already long list of causes. Even if the intake of nutritional elements is increased, however, no prompt cure can be obtained. It is possible that morphologic transformations in their relationship to degenerative senile phenomena and ectodermal alterations are the reason for the persistence of this condition.

In the pathogenesis of Sjögren's syndrome, its close relation to allergic or rheumatic symptoms is remarkable. The starting point usually is a previously occurring infection which may lead to an excessive tissue reaction in which hereditary susceptibility plays a major part.

There is no certain treatment method. Hypophysis implantation has brought slight improvement, cortisone and ACTH produced no cure. Administration of vitamins (B complex, A and B_{12}) combined with iron preparations is justified and usually achieves improvement. The reports on sex hormone treatment are still too conflicting to permit its recommendation, especially because spontaneous relapses often occur.

Deaths

Abernethy, Ernest G., Farmingdale, N. J.; died November 15; aged 77.

Adkins, Claude E., Bremerton, Wash.; Kansas City-Western Dental College, 1929; died December 30; aged 55.

Allen, Walter W., Atlanta, Ga.; Atlanta Dental College, 1898; died January 23; aged 83.

Arms, Walter T., Worcester, Mass.; University of Pennsylvania School of Dentistry, 1910; died December 23; aged 71.

Babasin, Yervant H., Vernon, Texas; University of Iowa College of Dentistry, 1912; died February 5; aged 73.

Bagley, John N., Oxford, Ala.; University of Tennessee College of Dentistry, 1900; died November 25; aged 79.

Baker, Cecil H., Kansas City, Mo.; Western Dental College, Kansas City, 1912; died February 7; aged 65.

Balsiger, John H., Mars, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1905; died January 13; aged 74.

Banbury, John Q., Wichita, Kan.; Pittsburgh Dental College, Western University of Pennsylvania, 1908; died January 19; aged 72.

Banghart, Charles A., Kirkland, Wash.; Chicago College of Dental Surgery, Loyola University, 1896; died January 12; aged 86.

Barnes, John T., Nashville, Tenn.; Meharry Medical College, Dental Department, 1919; died January 28; aged 62.

Beckwith, Henry M., Framingham, Mass.; Tufts University, School of Dental Medicine, 1898; died December 27; aged 82.

Bement, Elbert S., Butler, Mo.; Western Dental College, Kansas City, 1903; died January 21; aged 84.

Bennett, Ralph L., Delmar, Del.; University of Pennsylvania, School of Dentistry, 1900; died January 18; aged 80.

Berry, Joshua J., Pleasantville, N. J.; Temple University, School of Dentistry, 1926; died January 9; aged 53.

Blain, James H., Grosse Pointe, Mich.; Detroit College of Medicine Department of Dental Surgery, 1898; died February 3; aged 83.

Bond, Edwin L., Dayton, Ohio; Baltimore College of Dental Surgery, University of Maryland, 1900; died February 3; aged 85.

Bott, Olen J., Greenfield, Ill.; St. Louis University, School of Dentistry, 1919; died January 19; aged 62.

Bowen, Harvey L., New Orleans; died January 5; aged 68.

Boyens, Ernest W., Orland, Calif.; Colorado College of Dental Surgery, 1912; died August 31; aged 68.

Bradfield, William K., Dothan, Ala.; Washington University School of Dentistry, St. Louis, 1908; died December 5; aged 72.

Branower, Edmund, New York; College of Dental and Oral Surgery, New York, 1917; died January 19; aged 67.

Brown, Fred H., Enosburg Falls, Vt.; Baltimore College of Dental Surgery, 1898; died January 8; aged 81.

Burke, Frank T., Brockton, Mass.; Harvard University Dental School, 1916; died June 23; aged 64.

Cain, Walter T., Colorado Springs, Colo.; University of Denver School of Dentistry, 1902; died January 27; aged 78.

Canoyer, Clarence C., Brookfield, Mo.; Kansas City Dental College, 1897; died January 31, aged 87.

Carpenter, Howard G., Princeton, Ill.; Chicago College of Dental Surgery, Loyola University, 1911; died January 18; aged 67.

Cheeks, Alan D., Roxbury, Mass.; College of Physicians and Surgeons, Dental Department, Boston, 1911; died May 6; aged 81.

Clark, Neil T., Shaker Heights, Ohio; University of Michigan College of Dental Surgery, 1911; died February 5; aged 68.

Clayton, Walter H., New York; New York College of Dentistry, 1891; died February 14; aged 90.

Cobb, Whitmel S., Birmingham, Ala.; Marion-Sims Dental College, St. Louis, 1904; died December 6; aged 78.

Connell, Ewing B., Chattanooga, Tenn.; Vanderbilt University School of Dentistry, 1913; died February 8; aged 65.

Corl, Harvey B., Toledo, Ohio; Ohio Medical University, College of Dentistry, 1901; died January 8; aged 83.

Courtney, Glen W., Jr., Austin, Texas; Baylor University College of Dentistry, 1945; died December 24; aged 32.

Cunningham, Frank L., Manistee, Mich.; University of Michigan College of Dental Surgery, 1902; died February 2; aged 79.

Cunningham, Samuel L., Union City, Tenn.; died January 21.

Davis, Joseph, Brooklyn; New York College of Dentistry, 1917; died February 1; aged 65.

Davis, Wilbur E., Terre Haute, Ind.; died January 2; aged 70.

Dibert, Emery, Springfield, Ohio; Starling-Ohio Medical College Department of Dentistry, 1912; died January 15; aged 68.

Dickinson, Harry L., Alton, Ill.; died January 19; aged 81.

Dietrich, Arthur C., Milwaukee; Marquette University Dental School, 1907; died January 5; aged 69.

Dillon, Harry D., San Diego; Northwestern University Dental School, 1904; died January 13; aged 74.

Dolph, Herbert C., Denver; University of Denver School of Dentistry, 1904; died January 15; aged 73.

Donkin, Elbert B., Paso Robles, Calif.; University of California College of Dentistry, 1922; died December 11; aged 56.

Drew, Alfred J., Chicago, Ill.; Northwestern University Dental School, 1915; died February 26; aged 66.

Dunlap, Robert M., Phoenix, Ariz.; Northwestern University Dental School, 1912; died January 27; aged 66.

Erbaugh, Hudson S., Logansport, Ind.; Indiana University School of Dentistry, 1935; died December 17; aged 48.

Farthing, John C., Boone, N. C.; Atlanta Dental College, 1910; died January 7; aged 73.

Fast, Ephraim B., Fairchance, Pa.; Philadelphia Dental College, 1890; died January 3; aged 94.

Ferguson, John T., Chapel Hill, Tenn.; University of Tennessee College of Dentistry, 1903; died January 25; aged 80.

Figg, John W., Iowa City, Iowa; University of Iowa College of Dentistry, 1916; died January 30; aged 66.

Finley, Alfred L., Escondido, Calif.; University of Southern California, College of Dentistry, 1928; died January 4; aged 62.

Foster, Victor C., Elgin, Ill.; Chicago College of Dental Surgery, Loyola University, 1933; died January 20; aged 49.

French, John H., Raleigh, N. C.; University of Tennessee College of Dentistry, 1953; died December 23; aged 25.

Frisch, Lawrence, Roxbury, Mass.; Harvard University Dental School, 1924; died March 16; aged 75.

Gelman, Nathan, Passaic, N. J.; University of Pennsylvania School of Dentistry, 1924; died February 1; aged 54.

Gerber, Benjamin, Philadelphia, Pa.; Temple University, School of Dentistry, 1938; died January 9; aged 40.

Gleason, Frederick J., Scituate, Mass.; Temple University, School of Dentistry, 1924; died February 7; aged 59.

Gorman, James R., Fall River, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1924; died May 9; aged 56.

Grover, Charles G., Denver, Colo.; University of Denver, School of Dentistry, 1920; died February 7; aged 63.

Hall, Charles T., Augusta, Ga.; Atlanta Dental College, 1896; died December 24; aged 81.

Hammond, George A., Port Jervis, N. Y.; New York College of Dentistry, 1893; died January 1; aged 83.

Harte, Roy V., Sheboygan, Wis.; Marquette University Dental School, 1919; died December 31; aged 64.

Hasselbach, Charles M., Washington, D. C.; Columbian University Dental Department, 1901; died January 9; aged 82.

Hawkins, Oliver I., Chicago; Meharry Medical College Dental Department, 1917; died December 17; aged 75.

Hayden, Augustus H., Columbia S. C.; Atlanta-Southern Dental College, 1923; died January 28; aged 60.

Heitman, Frederick W., Merced, Calif.; Washington University, School of Dentistry, St. Louis, 1901; died February 4; aged 76.

Hines, Walter E., Maysville, Ky.; Ohio College of Dental Surgery, University of Cincinnati, 1922; died December 25; aged 57.

Hodges, Edward A., Newkirk, Okla.; Indiana Dental College, 1898; died January 21; aged 80.

Holmes, John G., Trezevant, Tenn.; Vanderbilt University, School of Dentistry, 1906; died December 27; aged 80.

Hopkins, John M., Detroit; University of Michigan, College of Dental Surgery, 1917; died January 23; aged 60.

Hostetler, Claude B., Ostrander, Ohio; Chicago College of Dental Surgery, Loyola University, 1905; died January 5; aged 74.

Houser, David G., Ames, Iowa; University of Iowa, College of Dentistry, 1901; died January 16; aged 79.

Ihle, Chester, Chicago; Northwestern University Dental School, 1916; died February 14; aged 62.

Ingraham, Mark E., Burlingame, Calif.; University of California, College of Dentistry, 1927; died January 8; aged 56.

Jacobs, Isidore, Brooklyn; Tufts University, School of Dental Medicine, 1919; died January 21; aged 63.

Jay, Milan S., Dallas, Texas; Baylor University, College of Dentistry, 1936; died January 28; aged 44.

Johnston, John R., Cincinnati; Cincinnati College of Dental Surgery, 1900; died January 19; aged 80.

Jones, Edward H., Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1923; died January 15; aged 58.

Jones, Ernest M., Seattle, Wash.; Northwestern University Dental School, 1916; died February 8; aged 65.

Kahn, Edmund, Baltimore; Baltimore College of Dental Surgery, University of Maryland, 1904; died February 1; aged 74.

Kaplan, Isidore, Brooklyn; Columbia University, School of Dental and Oral Surgery, 1926; died January 29; aged 54.

Kelly, John D., Montrose, Pa.; Philadelphia Dental College, 1898; died December 28; aged 87.

Kerfoot, George O., Batavia, Ill.; Northwestern University Dental School, 1894; died October 4; aged 84.

Kirkland, Charles F., Convoy, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1903; died January 27; aged 78.

Knox, Roscoe C., Atlanta, Ga.; Atlanta-Southern Dental College, 1937; died February 2; aged 43.

Kratzer, Earl R., Baldwinsville, N. Y.; Philadelphia Dental College, 1901; died January 1; aged 78.

Kreidler, Emil J., Cleveland; Western Reserve University College of Dentistry, 1921; died January 11; aged 57.

Lestico, Alexander C., Faribault, Minn.; University of Minnesota College of Dentistry, 1906; died December 26; aged 73.

Levington, Herbert T., Savannah, Ga.; Atlanta-Southern Dental College, 1932; died January 25; aged 55.

Levitas, Aaron L., Newark, N. J.; Ohio State University, College of Dentistry, 1935; died January 17; aged 42.

Lytle, John W., Glendale, Calif.; University of Pittsburgh School of Dentistry, 1925; died January 6; aged 56.

Macauley, Forrest E., Wakefield, Mass.; Tufts University, School of Dental Medicine, 1919; died January 17; aged 61.

Maher, John F., Ridgewood, N. J.; College of Dental and Oral Surgery, New York, 1919; died January 20; aged 60.

Majoros, John, Youngstown, Ohio; Western Reserve University, College of Dentistry, 1914; died January 12; aged 73.

McCabe, Daniel F., Brookline, Mass.; died December 21; aged 74.

McDonald, Thomas B., Ozark, Ala.; Atlanta-Southern Dental College, 1904; died November 6; aged 86.

McMaster, Glenn A., Essex, Iowa; Northwestern University, Dental School, 1902; died January 20; aged 77.

McQuillan, William P., Pittsburgh; University of Pittsburgh, School of Dentistry, 1911; died January 12; aged 71.

Meckel, Cullen B., Indianapolis; Indiana Dental College, 1918; died February 1; aged 61.

Merrill, Ernest S., Lowell, Mass.; Tufts University, School of Dental Medicine, 1911; died April 12; aged 67.

Michels, William I., Jr., St. Claire Shores, Mich.; University of Detroit, School of Dentistry, 1951; died December 18; aged 28.

Mikula, Edward W., Chicago; Chicago College of Dental Surgery, Loyola University, 1921; died November 2; aged 65.

Millis, Henry C., Buffalo; University of Buffalo, School of Dentistry, 1903; died January 24; aged 73.

Mims, William S., Huntsville, Ala.; Vanderbilt University, School of Dentistry, 1911; died November 23; aged 65.

Minium, William H., Meadville, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1908; died January 20; aged 75.

Moodie, Lorne, Superior, Wis.; University of Michigan, College of Dental Surgery, 1900; died January 6; aged 76.

Moran, William H., Cambridge, Mass.; Tufts University, School of Dental Medicine, 1921; died December 31; aged 66.

Movsesyan, Kevork H., Leonia, N. J.; Northwestern University, Dental School, 1933; died February 2; aged 57.

Nelson, Theron W., Princeton, Minn.; University of Minnesota, College of Dentistry, 1926; died December 23; aged 54.

Nolan, Arthur H., Madison, S. D.; Northwestern University, Dental School, 1916; died December 21; aged 63.

Nosanow, Harry, Philadelphia; Temple University, School of Dentistry, 1927; died January 4; aged 56.

Nourie, Edward J., Kankakee, Ill.; Chicago College of Dental Surgery, Loyola University, 1907; died February 25; aged 70.

Olcott, Morton D., Canastota, N. Y.; University of Michigan, College of Dental Surgery, 1912; died January 23; aged 66.

Orella, Victor P., Piedmont, Calif.; College of Physicians and Surgeons, San Francisco, 1901; died May 31; aged 81.

Painter, Everett G., Darien, Conn.; University of Pennsylvania, School of Dentistry, 1953; died February 1; aged 27.

Parcher, Leon E., Revere, Mass.; Tufts University, School of Dental Medicine, 1908; died January 5; aged 70.

Paulsen, England C., Homewood, Ill.; Chicago College of Dental Surgery, Loyola University, 1928; died October 18; aged 49.

Peters, Edward H., Peoria, Ill.; died December 8; aged 89.

Petraglia, Carmen A., Pittsburgh; University of Pittsburgh, School of Dentistry, 1940; died February 3; aged 39.

Pierce, Edmund A., Greenwood, R. I.; Tufts University, School of Dental Medicine, 1916; died February 5; aged 61.

Radin, Harry R., Newark, N. J.; New York Dental School, 1904; died February 1; aged 72.

Reiff, Bernard B., Wilkes Barre, Pa.; Temple University, School of Dentistry, 1946; died February 2; aged 33.

Reppeto, William M., Dallas, Texas; University of Minnesota, College of Dentistry, 1922; died January 12; aged 54.

Reynolds, John A., Birmingham, Ala.; Atlanta Dental College, 1916; died October 3; aged 66.

Ripley, Ralph D., Brookhaven, Miss.; New Orleans College of Dentistry, 1908; died January 16; aged 70.

Roberts, Edward R., Fargo, N. D.; Northwestern University, Dental School, 1908; died December 8; aged 70.

Rose, Edward S., Dupo, Ill.; Washington University, School of Dentistry, St. Louis, 1911; died January 4; aged 68.

Rubelman, George H., Tecumseh, Neb.; Creighton University, College of Dentistry, 1925; died December 21; aged 59.

Rubenstein, Nathan, Newark, N. J.; Medico-Chirurgical College of Philadelphia, 1908; died January 7; aged 74.

Rush, Gustavus A., Meridian, Miss.; Atlanta Dental College, 1903; died December 31; aged 77.

Sanders, Lloyd L., Medford, Ore.; North Pacific College of Oregon, School of Dentistry, Portland, 1927; died January 11; aged 55.

Sarber, Elmer O., Waupaca, Wis.; United States Dental College, Chicago, 1892; died September 14; aged 86.

Schall, Harrison W., Kittaning, Pa.; Baltimore College of Dental Surgery, University of Maryland, 1913; died January 18.

Schlesinger, William, San Francisco, Calif.; College of Physicians and Surgeons, San Francisco, 1926; died October 25; aged 62.

Shapiro, Benjamin D., Rockaway Beach, N. Y.; New York College of Dentistry, 1909; died January 28; aged 70.

Sheppe, Alfred H., Huntington, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1923; died December 28; aged 63.

Shoush, Warren S. H., Kansas City, Mo.; Kansas City-Western Dental College, 1923; died February 8; aged 57.

Smith, Durwood C., Tyner, Ky.; St. Louis University, School of Dentistry, 1930; died January 3; aged 52.

Spiegelglass, Harold L., Hackensack, N. J.; University of Pittsburgh, School of Dentistry, 1932; died January 12; aged 45.

Spitler, Harley G., Dayton, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1900; died January 22; aged 79.

Stanton, Oscar E., Vickery, Ohio; Western Reserve University, College of Dentistry, 1910; died January 7; aged 65.

Starr, Solomon P., Wauconda, Ill.; University of Illinois, College of Dentistry, 1911; died September 4; aged 77.

Stevens, Lester S., Gardena, Calif.; University of Southern California, College of Dentistry, 1941; died February 10; aged 40.

Stipp, Harold A., Paoli, Ind.; Indiana Dental College, 1915; died January 1; aged 61.

Sturdevant, Tracy B., Elmira, N. Y.; University of Pennsylvania, School of Dentistry, 1912; died December 27; aged 69.

Sullivan, Arthur J., Whitman, Mass.; Tufts University, School of Dental Medicine, 1924; died January 18; aged 54.

Sullivan, George A., Dorchester, Mass.; School of Dental Medicine, Tufts University, 1907; died December 18; aged 81.

Swift, Donald A., Scranton, Pa.; Georgetown University, School of Dentistry, 1923; died January 25; aged 57.

Swift, Franklin R., New Haven, Conn.; Temple University, School of Dentistry, 1924; died January 26; aged 52.

Taylor, Robert C., Newport News, Va.; University of Pennsylvania, School of Dentistry, 1919; died December 20; aged 62.

Teague, Horace S., Bedford, Mass.; Tufts University, School of Dental Medicine, 1924; died May 7; aged 54.

Thomas, Charles L., Dallas, Texas; George Washington University, Dental Department, 1919; died January 10; aged 68.

Travis, Frank E., Sherborn, Mass.; Harvard University, Dental School, 1903; died December 28; aged 73.

Tyler, Earl C., Iron River, Mich.; Northwestern University, Dental School, 1906; died January 11; aged 87.

Usher, Clyde W., Santa Barbara, Calif.; College of Physicians and Surgeons, San Francisco, 1907; died January 21; aged 75.

Vickers, Hollie H., Charleston, W. Va.; University of Louisville, School of Dentistry, 1932; died January 7; aged 50.

Wade, John A., Marlboro, Mass.; Tufts University, School of Dental Medicine, 1916; died May 27; aged 68.

Wallace, William D., Friend, Neb.; University of Nebraska, College of Dentistry, 1925; died January 12; aged 55.

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N. J.
Ninety-Eighth Annual Session	Nov. 4-7, 1957	Miami, Fla.
Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 16-18, 1957	Birmingham	F. A. Finney, Jr.	Box 787, Gadsden
Alaska	Aug. 15-18	Fairbanks	J. L. Irby	1010 Noble St., Fairbanks
Arizona			R. W. Christensen	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 7-10, 1957	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 15-17, 1957	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 7-10, 1957	Los Angeles	S. M. Silverman	903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 21-24	Colorado Springs	W. R. Humphrey	Republic Bldg., Denver
Connecticut	May 15-17, 1957	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware	Jan. 1957		J. C. Gantt	1102 N. Jackson, Wilmington
District of Columbia	Mar. 10-13, 1957	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	Apr. 15-17, 1957	St. Petersburg	W. A. Buhner	167 Broadway, Daytona Beach
Georgia	Oct. 21-24	Savannah	J. W. Yarbrough	Southern United Bldg., Macon
Hawaii	Sept. 10-15	Maui Island	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	Sept. 5-7	Sun Valley	D. E. Sonius	125 Fourth Ave., N., Twin Falls
Illinois	May 12-15, 1957	Peoria	P. W. Clopper	Jefferson Bldg., Peoria
Indiana			D. C. Barnhill	Bankers Trust Bldg., Indianapolis
Iowa	May 5-8, 1957	Des Moines	H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	May 13-16, 1957	Wichita	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Mar. 31-Apr. 3, 1957	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 24-27, 1957	Lake Charles	J. S. Bernhard	2515 Line Ave., Shreveport
Maine			S. M. Gower	Box 27, Skowhegan
Maryland	May 5-8, 1957	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 5-8, 1957	Boston	H. E. Tingley	12 Bay State Rd., Boston
Michigan			F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 1-3, 1957	Minneapolis	C. V. E. Cassel	Hamm Bldg., St. Paul
Mississippi			B. A. Cohen	Plaza Bldg., Jackson
Missouri	May 26-29, 1957	St. Louis	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana			E. G. Vedova	Box 311, Roundup
Nebraska	Apr. 29-May 1, 1957	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	May 1957	Las Vegas	O. M. Seifert	506 Humboldt St., Reno
New Hampshire			F. E. Williams	814 Elm St., Manchester
New Jersey	May 12-15, 1957		J. G. Carr	407 Cooper St., Camden
New Mexico			J. S. Eilar	Medical Arts Sq., N.E. Albuquerque
New York			C. A. Wilkie	1 Hanson Pl., Brooklyn
North Carolina			R. D. Coffey	Box 270, Morganton
North Dakota	Apr. 28-May 1, 1957	Fargo	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio	Oct. 28-31	Columbus	E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 14-17, 1957	Tulsa	S. A. Russman	1219 Classen Dr., Oklahoma City
Oregon	Mar. 4-6, 1957	Portland	T. D. Holder	Selling Bldg., Portland

State	Date	Place	Secretary	Address
Panama Canal Zone			A. L. Robertson	5700 USAF Dispensary, Albrook Air Force Base
Pennsylvania			M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico	Nov. 25		R. Carrasquillo	P. O. Box 214, De Diego #3, Rio Piedras
Rhode Island			J. S. Allen	Union Trust Bldg., Providence
South Carolina			J. R. Owings	7 Medical Court, Greenville
South Dakota			R. E. Decker	Parker
Tennessee			A. M. Ballentine	215 W. Flower St., Pulaski
Texas			W. Ogle	3707 Gaston Ave., Dallas
Utah	May 23-25, 1957	Salt Lake City	R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont			E. H. Van Santvoord	22 Washington St., Rutland
Virginia	Apr. 29-May 1, 1957	Virginia Beach	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	Mar. 28-30, 1957		J. M. Deines	227 Broadway, N., Seattle
West Virginia	July 22-25	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 29-May 1, 1957	Milwaukee	H. O. Hoppe	1331 W. Vliet St., Milwaukee
Wyoming			T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama			W. L. McCarty	Professional Center, Montgomery
Alaska	Aug. 7-10* Aug. 7, 8†	Fairbanks	R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas			W. T. Jones	107 E. Shelton, Monticello
California	July 23	San Francisco	T. G. Atwood	450 Sutter St., San Francisco
Colorado			R. F. Gilmore	Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	1835 Eye St., N.W., Washington
Florida	July 9-19*†	Jacksonville	R. P. Taylor, Jr.	P. O. Box 2913, Jacksonville
Georgia			P. M. McNeil	First National Bank Bldg., Rome
Hawaii	Aug. 30-Sept. 3‡		H. L. Houvener	Dillingham Bldg., Honolulu
Idaho			A. G. DeWinter	Sun Bldg., Boise
Illinois	Nov. 27-30‡		W. A. McKee	Wood Bldg., Benton
Indiana	Nov. 5-8*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa			P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas			G. L. Teall	Box 71, Hiawatha
Kentucky			J. J. Kelly	102 W. Madison St., Franklin
Louisiana			R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			A. S. Appleby	Box 260, Skowhegan
Maryland			H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts			J. T. Glennon	323 Main St., Woburn
Michigan			J. L. Champagne	3714 W. McNichols Rd., Detroit
Minnesota			M. G. Walls	615 Montcalm Pl., St. Paul
Mississippi			J. C. Boswell	Lamar Life Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg., Jefferson City
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska			H. E. Weber	Federal Securities Bldg., Lincoln
Nevada			R. Whitehead	Masonic Temple, Reno
New Hampshire			S. G. Markos	8 Renaud Ave., Dover
New Jersey			W. A. Wilson	150 E. State St., Trenton
New Mexico			J. J. Clarke, Sr.	Artesia
New York	Oct. 10, 11, 16-19*‡ Oct. 10, 16 17†‡		D. W. Beier	23 S. Pearl St., Albany 7
North Carolina			J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota	July 9-13	Fargo	T. M. Flath	Williston
Ohio			H. B. Smith	322 E. State St., Columbus
Oklahoma			W. E. Cole	First National Bldg., Oklahoma City
Oregon			F. L. Utter	Pioneer Trust Bldg., Salem

State	Date	Place	Secretary	Address
Pennsylvania			A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			J. L. Gunter	1226 Pickens St., Columbia
South Dakota			H. T. Aker	Canton
Tennessee			C. R. Aita	Bennie Dillon Bldg., Nashville
Texas			R. T. Weber	Capital National Bank Bldg., Austin
Utah			G. W. Vogel	Eccles Bldg., Ogden
Vermont			P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia			J. B. Davis	Goff Bldg., Clarksburg
Wisconsin			S. F. Donovan	Tomah
Wyoming			W. A. Hocker	O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
American Academy of Oral Roentgenology	Sept. 28, 29	Atlantic City, N.J.	H. M. Berry Jr. Secy.	4001 Spruce St., Philadelphia 4
American Academy of Periodontology	Sept. 27-29	Atlantic City, N.J.	C. E. Chamberlain Secy.	1101 N. North St., Peoria, Ill.
American Association of Dental Examiners	Sept. 28, 29	Atlantic City, N.J.	C. A. Bumstead Secy.	Stuart Bldg., Lincoln, Neb.
American Board of Dental Public Health	Sept. 27, 28	Atlantic City, N.J.	P. E. Blackerby, Jr. Secy.	250 Champion St., Battle Creek, Mich.
American College of Dentists	Sept. 30	Atlantic City, N.J.	O. W. Brandhorst Secy.	4221 Lindell Blvd., St. Louis 8
American Dental Assistants Association	Oct. 1-4	Atlantic City, N.J.	M. L. Martin Exec. Secy.	410 First National Bank Bldg., La Porte, Ind.
American Dental Society of Anesthesiology	Sept. 29, 30	Atlantic City, N.J.	A. J. Follenius Secy.	73 New York Pl., Staten Island 14, N.Y.
American Dental Society of Europe	July 10-13	London, England	J. P. Molony Hon. Secy.	110 Harley St., London W.1, England
American Denture Society	Sept. 28, 29	Atlantic City, N.J.	V. L. Steffel Secy.	College of Dentistry, Ohio State University, Columbus
American Institute of Dental Medicine	Nov. 4-8	Palm Springs, Calif.	M. Lewis Exec. Secy.	2240 Channing Way, Berkeley 4, Calif.
American Public Health Association, Inc.	Nov. 12-16	Atlantic City, N.J.	R. M. Atwater Exec. Secy.	1790 Broadway, New York
American Society of Dentistry for Children	Sept. 28-30	Atlantic City, N.J.	H. C. Hester Pub. Chm.	Arcade Bldg., Glen Ridge, N.J.
American Society of Oral Surgeons	Sept. 25-28	New York	R. F. Whalen Exec. Secy.	M.C.V. Box 876, Richmond, Va.
Association of American Women Dentists	Oct. 1	Atlantic City, N.J.	N. E. McDonald Secy.	151 Engle St., Englewood, N.J.
Bermuda Dental Association, Mid-Atlantic Dental Conference	Oct. 7-10	Hamilton, Bermuda	W. C. Price	Bermuda Dental Association, Hamilton, Bermuda
Chicago Dental Society	Feb. 3-6, 1957	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago
Council on Dental Education, Dental Aptitude Tests	Oct. 5, 6		S. Peterson Secy.	222 E. Superior St., Chicago
Danish Dental Association	Sept. 27	Copenhagen, Denmark	F. Orth	Østerbrogade 4, Copenhagen, Denmark
Denver Dental Association	Jan. 6-9, 1957	Denver	E. T. Klein Secy.	Republic Bldg., Denver
European Orthodontic Association	Aug. 9-13	Stockholm, Sweden	A. Lundström	Stureplan 19, Stockholm, Sweden
German Society for Dentofacial and Oral Surgery	July 26-28	Hamburg, Germany	K. Schuchardt	Johnsallee 3, Hamburg 13, Germany
Greater New York Dental Meeting	Dec. 3-7	New York	R. E. Morse Gen. Chm.	Hotel Statler, New York 1

Name	Date	Place	Secy. or Chm.	Address
Mid-Continent Dental Congress and Centennial Meeting of the St. Louis Dental Society	Nov. 25-28	St. Louis	J. E. Brophy Exec. Secy.	8013 Maryland Ave., St. Louis 5
National Association of Seventh-Day Adventist Dentists	Sept. 28-30	Atlantic City, N.J.	J. Bata, Jr. Secy.	5403 Queens Chapel Rd., Hyattsville, Md
National Board of Dental Examiners	Dec. 3, 4		G. J. Casey Secy.	222 E. Superior St., Chicago
New England Dental Society	Oct. 24, 25	Boston	F. L. Finley, Jr. Secy.	43 Farmington Ave., Hartford, Conn.
New Orleans Dental Conference	Nov. 11-14	New Orleans	B. G. Frick, Jr. Secy.	Maison Blanche Bldg., New Orleans 16
Northeastern Society of Orthodontists	Oct. 29, 30	Hartford, Conn.	W. J. Prezzano Secy.	Medical Centre, White Plains, N.Y.
Peruana Society of Dental and Maxillofacial Prosthesis, First National Congress	Sept. 19-22	Lima, Peru	J. Begazo S. Secy.	Pasaje Olaya 156, No. 38, Lima, Peru
Scandinavian Congress	July 4-7	Stockholm, Sweden	W. Waldvik	Kungsgatan 18, Stockholm, Sweden
Southern Society of Orthodontists	Aug. 19-22	White Sulphur Springs, W.Va.	M. D. Edwards Secy.	132 Adams Ave., Montgomery, Ala.
Southwestern Society of Orthodontists	Oct. 7-10	Houston, Texas	H. S. Born Secy.	908 S. Johnstone Ave., Bartlesville, Okla.
Thirteenth German Dental Meeting	Aug. 20-26	Munich, Germany	F. H. Witt	Universitaetsstrasse 73, Cologne-Lindenthal, Germany
Thirtieth Journees Dentaires Internationales de Paris	Nov. 26-Dec. 2	Paris, France	P. Coustaing Secy. Gen.	50, rue Pierre Charron, Paris, France
Thirty-first Italian Congress of Stomatology	Sept. 24-29	Florence, Italy	M. Bergamini	Via S. Gallo 25, Florence, Italy
Twelfth International Dental Congress	Sept. 7-14	Rome, Italy	P. Lalli Secy. Gen.	Via Boezio 16, Rome, Italy

CLASSIFIED ADVERTISING

Forms close on 25th
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Remittance Must Accompany Classified Ads.

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Replies to A.D.A. box number ads should be addressed as follows:
American Dental Association
222 E. Superior Street
Chicago 11, Ill. Box.....
Please be sure that the box number appears on the envelope.

OFFICES FOR SALE

ARKANSAS—For sale in downtown Little Rock, established practice. Office and equipment two years old. Two air-conditioned operatories, one coral and one green. Rent $85, includes utilities, air, maid service and elevator. Will sell outright in the fall or consider association until January 1957. Write Dr. Roger H. Howard, 519-520 Donaghey Bldg., Little Rock, Ark.

•

CALIFORNIA—Clovis. Excellent location and opportunity for dentist in fast growing area. Six room office for sale, air-conditioned, with three renting units in rear; 15 miles from Fresno. O. M. DeLaney, 5505 E. Indianapolis St., Fresno 27, Calif.

•

CALIFORNIA—Three chair dental office with one dental hygienist unit. Occupied by same doctor for years. Located in suburban San Diego. City of La Mesa, with population of 20,000, in the center of the fastest growing area in the U. S. Communicate with Pete Palermo, 8360 University Ave., La Mesa, Calif.

•

CALIFORNIA—For sale. One man practice grossing $10,000 monthly in North Hollywood. 1955 gross $77,000. Leaving U. S. Will stay with buyer reasonable length of time. Terms available. Low rent. Four chairs, Ritter equipped, 2 x-rays, 2 laboratories, private office, nurse's office, dark room, reception room, storerooms. Howard M. Stein, 6631 Laurel Canyon Blvd., North Hollywood, Calif.

•

CALIFORNIA—Country living at its best in Alpine, Calif. For sale. Three bedrooms, two baths, horse barn, stalls, steel corrals, separate dental office. Help quarters, family orchard, 14 acres. Write Dr. Robert D. Mercer, 331 Nutmeg St., San Diego 3, Calif.

•

COLORADO—Denver. For sale. Fine two-chair, air-conditioned modern office on east side of town. Gross over $22,000. Established six years. Fully equipped. Excellent clientele. Selling because travel is inconvenient from my present residence. Address A.D.A. Box No. 366.

•

CONNECTICUT—Center of Bridgeport. For sale, fully equipped two-chair, air-conditioned suite in new office building, elevator service. Well established general practice, much above average income. Limiting practice to orthodontics. Will stay until firmly established. Address A.D.A. Box No. 367.

CONNECTICUT—For sale. Modern two-chair dental office near New York. Waiting room, business office and one operating room with Ritter G-unit. Newly furnished one year ago. Also dark room, lavatory, and complete laboratory. Will give option to purchase building with two other apartments. Owner leaving state. Address A.D.A. Box No. 362.

•

FLORIDA—Miami Beach. Will form an association or sell. Completely equipped, modern, two-chair office. Air-conditioned elevator building. Finest central location, main street, Lincoln Rd. Available after June 1956. Address A.D.A. Box No. 321.

•

ILLINOIS—For sale. Complete dental office. Ritter unit, x-ray and air-conditioner. Retiring after 50 years of practice. Reasonable. Dr. W. M. Lemon, 80 S. La Grange Rd., La Grange, Ill.

•

INDIANA—For sale. Well established, lucrative practice in small city. Low overhead. Two-chair, fully equipped, ground floor office with home combination. Experienced, pleasant assistant available. Ideally located. Convenient terms. Dentist will introduce. Address A.D.A. Box No. 354.

•

INDIANA—South Bend. For sale. Modern, fully equipped dental office, located in neighborhood business district, in same building with M.D. and architect. Exceptional opportunity. Financial arrangements to suit interested party. Contact Max Feldman, M.D., 1921 Miami St., South Bend 14, Ind.

•

MAINE—Bar Harbor. For sale. Busy practice and office of two operating rooms, laboratory, waiting room. All modern equipment with instruments and supplies included. Finest location. Selling because of illness. Galem Cunningham, 412 E. 65th St., Apt. 48, New York 21.

•

MARYLAND—Baltimore. For sale. Busy, established general practice in residential district. Modern office with two very attractive and fully equipped operating rooms, all on ground floor, adjacent to ethical commercial laboratory. Reasonable rent. Owner entering service. Address A.D.A. Box No. 365.

•

MASSACHUSETTS—For sale. In south shore town, combination home and dental office. Established 20 years. One mile from fine beach. Town has grown 28% in ten years. Excellent opportunity for young den-

tist. Owner retiring. Can be financed. Address A.D.A. Box No. 371.

•

NEW HAMPSHIRE—For sale. Combination home and dental office in lovely college community (Dartmouth), Hanover, N. H. Built in 1953. $40,000. Dr. N. W. Barrett, 31 S. Park St., Hanover, N. H.

•

NEW JERSEY—For sale. Well established 30 years, general practice, two-chair office and equipment. Located in seashore city near New York. Retiring because of health. Address A.D.A. Box No. 246.

•

NEW JERSEY—For sale. Two-chair practice in New Jersey. Air-conditioned, newly decorated and re-equipped. Thriving practice, over $30,000 some years, can be increased by younger man. Owner retiring. Top type of practice, will introduce. Dental assistant will remain if desired. Same locality 37 years. Wonderful opportunity. Write Dr. George W. Phelan, 400 38th St., Union City, N. J

•

NEW YORK—Yorktown Heights. Fastest growing town in Westchester County. For sale. Fully equipped, modern dental office, including practice. Address A.D.A. Box No. 378.

•

NEW YORK—For sale. Two-chair office in prominent corner location, New York City. Excellent transportation facilities. Address A.D.A. Box No. 372.

•

NEW YORK—For sale. Excellent location: corner of congested business district, main thoroughfare, suburban Buffalo. Fully equipped air-conditioned dental office. Unusual opportunity in fast growing community. Reasonably priced. Terms. Address A.D.A. Box No. 385.

•

OHIO—For sale. Very reasonable. Large two-chair dental office complete with equipment and x-ray. Excellent opportunity to start immediately. Top downtown location in growing industrial city of 45,000, southwestern Ohio. For details address A.D.A. Box No. 379.

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OHIO—For sale. Very reasonable. Only dentist in prosperous, growing south central Ohio town serving 9,500 people. 1953 S. S. White equipment, one operating room, laboratory, dark room, central air-conditioning, blacktop parking lot, 1953 building, space designed for second operating room. Well established, long recall list, gross very easily of $26,000. Beautiful six room home available nearby. Owner leaving because of illness in family. Address A.D.A. Box No. 284.

•

WEST VIRGINIA—For sale. Southern West Virginia. Long established lucrative practice. Bungalow office, air-conditioned. Five operating rooms, fully equipped. Laboratory in connection. Dental hygienist. Will stay with buyer, until acquainted. Address A.D.A. Box No. 360.

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WEST VIRGINIA—For sale. Located in center of chemical industries, along the beautiful Ohio River. Long established, centrally located, modern, two-chair office. X-ray, reception room, laboratory and business office; drawing population of 15,000. Address A.D.A. Box No. 373.

OFFICES FOR RENT

CALIFORNIA—Riverside. For rent. Dental office (one of three in building with two pedodontists). Ideal for orthodontist or general practitioner. $125 a month, including utilities. Dr. Louis F. Parker, 6919 Magnolia Ave., Riverside, Calif.

•

FLORIDA—For rent. Dental office containing four operating rooms completely furnished. Two for rent with laboratory privileges. Downtown section with parking space St. Petersburg. Wesley Cone, D.D.S., 325 5th St., N. St. Petersburg, Fla.

•

ILLINOIS—New dental office with apartment for rent in southern Illinois town. Dental office not equipped. Rent very reasonable. No other dentist in town. References requested. Address A.D.A. Box No. 377.

•

INDIANA—For lease in new medical building with two physicians, four room suite for dentist, in northern Indiana farm community of 1,000. Drawing area 5,000. Unopposed. Write Dr. H. V. Johnson, Brook Health Center, Brook, Ind.

•

MINNESOTA—General practice. Opportunity to locate and share ground floor office with physician and surgeon in prosperous farming community in southern Minnesota. Contact R. F. Schmidt, M.D., Alden, Minn.

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OREGON—Dental office space is available for lease. This is new construction just outside the congested business district on a main thoroughfare. There is parking on the lot. Owners will finish interior to tenant's specifications. Surgical-Dental Court, Roy Harland, Masonic Bldg., Salem, Ore.

•

PENNSYLVANIA — Harrisburg. Office for rent. Ideal corner location, six rooms. Has been prosperous dental office for ten years. Will rent with or without equipment. Address A.D.A. Box No. 368.

OPPORTUNITIES AVAILABLE

Dentists

ARIZONA—Wanted. Young dentist. Excellent opportunity for individual practice. No competition. Office available in front of hospital. Population plus surrounding area 5,000. Historical western tourist town, Tombstone, Arizona. Write for details. Dr. Charles Keever, Tombstone, Ariz.

•

ARIZONA—Wanted. Dentist for children's dentistry exclusively, soon. Last two men here built lucrative practices. Rare opportunity for fine practice. Dr. L. P. Bairo, oral surgeon. 711 Professional Bldg., Phoenix, Ariz.

CONNECTICUT — Exceptional opportunity for dentist desiring active growing practice in most rapidly expanding town in Hartford area. Illness forces owner's retirement from this practice. Address A.D.A. Box No. 331.

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INDIANA—Wanted. Two dentists. Preferably veterans. Group practice. Guarantee $20,000 gross, first year. Chance to buy into group. General practice. Give full particulars in first letter. Indiana license required. Address A.D.A. Box No. 364.

•

NEW YORK—Opportunity for dentist with medical group practice in upstate New York. Must have New York state license. This group, offering comprehensive medical care, has three dentists, one vacancy at present. Semi-rural area. 120 miles from New York City. Salary commensurate with training and experience. Excellent opportunity for dentist interested in integrated medical practice, preventive medicine and rural living. Address A.D.A. Box No. 303.

•

OHIO—Associate wanted for well established oral surgery practice. Please give detailed experience and qualifications. Dr. Gordon R. Jobson, Suite 1018-20, Union Central Bldg., Cincinnati 2, Ohio.

•

OREGON—Dentist wanted in established medical clinic. Two-chair office, laboratory and separate waiting room. Only one dentist in town which serves an area of about 6,000 population. Excellent future. C. M. Wagner, M.D., Box 625, Heppner, Ore.

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PENNSYLVANIA — Pennsylvania licensed draft exempt dentist for two years only. Industrial dental health experience and knowledge essential. Postgraduate training and experience in roentgenology and exodontics required. State training and experience. Address A.D.A. Box No. 334.

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PENNSYLVANIA—Associate wanted for extensive general practice, in suburban Philadelphia. Address A.D.A. Box No. 374.

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WASHINGTON—Dentists for foreign missionary work. Excellent opportunities for qualified men in all parts of the world. For details apply to The Missionary Dentist, 5543 25th Ave., N.E., Seattle 5.

Hygienists

WASHINGTON—Hygienist wanted for two-man office. Excellent working conditions, good salary and a permanent position if qualified. Duties only those of a hygienist. Address A.D.A. Box No. 380.

OPPORTUNITIES WANTED

New Jersey licensed dentist desires to purchase active general practice or enter into arrangement with professional building group. Address A.D.A. Box No. 363.

•

General dentistry or hold M.S.D. for oral surgery. Also graduate work in public health dentistry. Ten years, Navy Dental Corps, six years, institutional and industrial dentistry, four years, private practice. Age 47. Consider foreign opportunity. Have National Board certificate. Address A.D.A. Box No. 310.

•

Navy veteran, 1954 New York license desires part or full time position in July until oral surgery residency starts in October. Preferably Westchester or nearby vicinity. Address A.D.A. Box No. 358.

•

Young dentist desires association in Pennsylvania with general practitioner engaged in the highest type of dental practice. Training and extensive experience in exodontics and oral surgery. Leave service July 1956. Address A.D.A. Box No. 348.

•

Wanted, association with oral surgeon or exodontist in Pennsylvania. Training and extensive oral surgery experience as chief of service at 550-bed Air Force hospital. Leave service July 1956. Address A.D.A. Box No. 349.

•

New York licensed, New York University graduate, 1954, seeks position or association outside New York metropolitan area. Completing Air Force tour August 1956. Additional experience: exodontics, endodontics, periodontics and operative dentistry. Complete resumé on request. Address A.D.A. Box No. 299.

•

California licensed dentist, age 28, completing service tour July 1956. Desires position or association in southern California. Preferably Los Angeles or vicinity. Excellent experience including oral surgery internship, general anesthesia. Address A.D.A. Box No. 381.

•

Florida. General practitioner, 17 years' experience, all phases, desires purchase active practice, Miami vicinity. Would consider association, ultimate partnership. Capable, personable, reliable, married, sober. Draft exempt. Engaged in successful private practice presently. Address A.D.A. Box No. 382.

•

California licensed dentist, 34, desires association in oral surgery or general practice. Ultimate purchase desired. Oregon graduate, general practice and hospital experience. Engaged in successful private practice at present. Address A.D.A. Box No. 383.

•

Florida licensed, 33 years of age, married, military obligation completed, eight years successful practice. Interested in purchase or association leading to purchase in a lower east coast or St. Petersburg area. Dr. Donald R. Olson, 625 Cleveland Ave., N.W., Canton 2, Ohio.

•

Oral surgeon available January 1957 desires association with well established oral surgeon or purchase practice. Licensed in New York and New Jersey. Would take other Boards. One year graduate work school of medicine. Two years oral surgery residency, one year fellowship, oral surgery and pathology. Military requirements completed. 1946 graduate. Address A.D.A. Box No. 384.

Florida resident and licensee, 1954 graduate of Northwestern University, completing military obligations in October, desires association or other opportunity with established dentist in St. Petersburg, Clearwater, Sarasota area. Address A.D.A. Box No. 375.

•

California licensed, age 35, unmarried, desires association with older dentist in southern California area. Ultimate partnership or purchase. Engaged in successful private practice at present. Address A.D.A. Box No. 376.

WANTED TO BUY

Wanted: **Ceramics in Dentistry,** by Cohen. Copyright Lea & Febiger, 1940. Write Paul E. Blickenstaff, Sec.-Treas., Oregon Association for Dental Research, 1735 N. E. 40th Ave., Portland, Ore.

•

Ritter Model F Split Unit (will consider Weber), American Mobile Cabinet, motor chair. Prefer pearl or green. State age, color and price. Must be first class condition. Dr. Paul Kilgore, 4912 Forest Ave., Downers Grove, Ill.

FOR SALE

X-ray, G.E. wall model, serial E 135123, $400; S. S. White Diamond Chair No. 3, $250; S. S. White Diamond Chair No. 2, $150; Master Unit A, S. S. White No. 283, $700; Air-dent $750; Ritter unit model A, $150; Ritter chair $100. All above mentioned equipment is in perfect working condition, located in the state of North Dakota. Address A.D.A. Box No. 361.

•

S. S. White Air-dent (air abrasive) machine. Latest model, excellent condition. Nozzles, tanks and all instruction manuals included. Will sell for best offer. Address A.D.A. Box No. 369.

•

Old or used dental books, journals, prints. Leo L. Bruder, 1 DeKalb Ave., Dept. 21, Brooklyn, N. Y. Dealer in out-of-print dental literature.

•

For sale, No. 3 S. S. White unit, No. 2 Ritter chair, black Pelton & Crane light, just rechromed and repainted, green. Excellent running condition. $300 for everything. P. O. Box 268, Fair Oaks, Calif.

•

Castle "95" sterilizer cabinet complete with 16 inch built-in sterilizer. Walnut enamel finish. Almost new condition. $125. Dr. Saul H. Kaplan, 4441 Collins Ave., Miami Beach, Fla.

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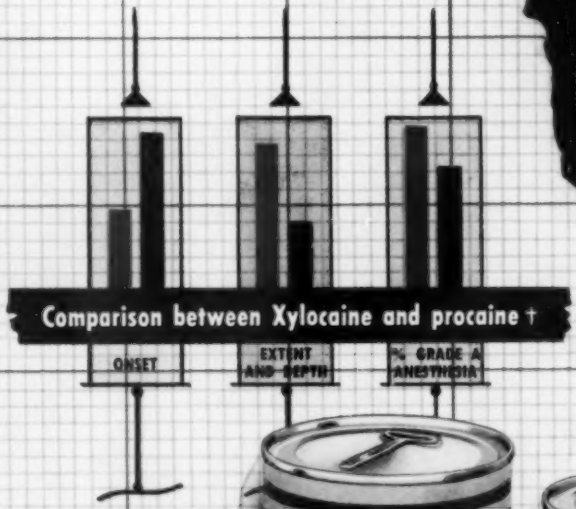
Complete Ritter dental outfit including x-ray and instruments in excellent condition. Installed in dwelling with office and reception room located near Lake Villa, Ill. Will sell as a unit or separately. Price reasonable, terms can be arranged. Wire, L. E. Jones, Menominee, Mich.



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†Huldt, S., "Factors Influencing the Efficiency of Dental Local Anesthetics in Man", Acta Odontologica Scandinavica, Volume 11, Supplement 13, 1953.

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Enriched Bread...

a Recognized Factor in the Improved Nutritional Status of America's School Children

ENRICHED BREAD (90 per cent of all white bread commercially sold in the United States) has participated prominently in the virtual eradication of classical deficiency diseases during recent years.[1,2] It has been credited with being one of the important factors in bringing about the improved status of nutritional child health.[3]

Virtually all such bread—by vitamin and mineral enrichment and by the use of non-fat milk solids averaging 4 per cent by weight of the flour used—supplies valuable amounts of thiamine, riboflavin, niacin, iron, and calcium. Its protein (39 grams per pound), composed of flour, milk, and yeast proteins, is of good biologic value, supporting growth as well as tissue maintenance.[4]

The nutrient contribution of enriched bread is shown in the appended table.

In a joint report of the Council on Dental Health and the Council on Dental Therapeutics[5] it is stated: "Available evidence indicates that starchy carbohydrates are of minor importance in the process of caries since complex carbohydrates cannot diffuse into bacterial plaques and cannot be degraded promptly to simple sugars in most mouths."

The American Dental Association states: "Good nutrition is important for growth and development. Diet affects dental health to a greater degree during the early years (before the age of 8) than at any other time. Therefore, an adequate diet is needed, particularly during the growing and developing years."[6]

Since enriched bread makes an important contribution to good nutrition, and apparently is of little cariogenic influence, it may well constitute a significant portion of the daily caloric intake.

1. Sebrell, W. H., Jr.: Trends and Needs in Nutrition, J.A.M.A. *152*:42 (May 2) 1953.
2. King, C. G.: Newer Concepts of Optimum Nutrition, Food Technol. *8*:486 (Nov.) 1954.
3. Kelly, H. T.: Impact of Modern Nutrition on Twentieth Century Morbidity, Pennsylvania M.J. *58*:481 (May) 1955.
4. Sherman, H. C.: Chemistry of Food and Nutrition, ed. 8, New York, The Macmillan Company, 1952, p. 212.
5. Joint Report of the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association: Sugar and Dental Caries: The Effect on the Teeth of Sweetened Beverages and Other Sugar-Containing Substances, J. Am. Dent. A. *47*:387 (Oct.) 1953.
6. "The Care of Children's Teeth," in Questions and Answers, 1954, American Dental Association, p. 14.

Nutrients and Calories Provided by 6 Slices of Enriched Bread and Their Percentages of Daily Dietary Allowances*

Nutrients and Calories 6 Slices		Percentages of Daily Allowances			
		Children (ages, 4 to 6 years)	Boys (ages, 13 to 15 years)	Men (age, 25 years)	Women (age, 25 years)
Protein	11.7 Gm.	23%	14%	18%	21%
Thiamine	0.33 mg.	41	21	21	28
Riboflavin	0.21 mg.	18	10	13	15
Niacin	3.0 mg.	38	19	19	25
Calcium	122 mg.	12	9	15	15
Iron	3.3 mg.	41	22	28	28
Calories	379	24	12	11	16

*National Research Council's recommended daily dietary allowances (1953): Children (ages, 4 to 6 years); weight, 40 lbs.; height, 43 inches. Boys (ages, 13 to 15 years); weight, 108 lbs.; height, 64 inches. Men (age, 25 years); weight, 143 lbs.; height, 67 inches. Women (age, 25 years); weight, 121 lbs.; height, 62 inches.

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Your Ney-Oro B-2 inlays and abutments, tough yet burnishable,
should be as perfect 20 years from now as they are today.
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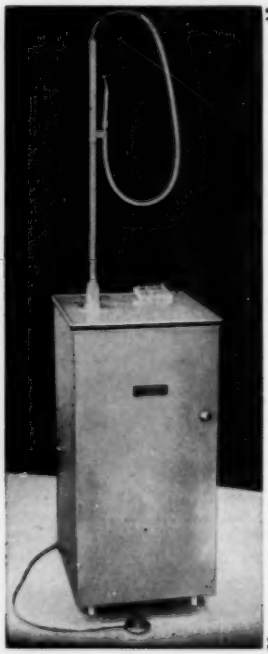

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*JADA Vol. 47, P. 324-329, Sept. 1953. NELSEN, R. J., D.D.S.; PELANDER, C. E.; KUMPULA, J. W.: Hydraulic Turbine Contra Angle Handpiece. (Reprint on request)

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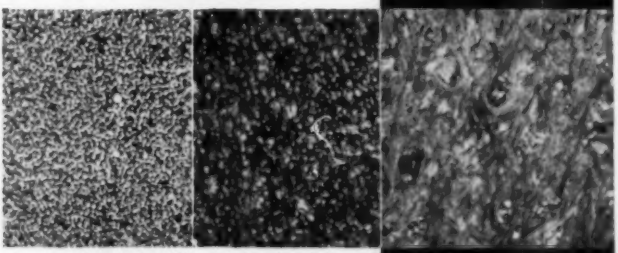

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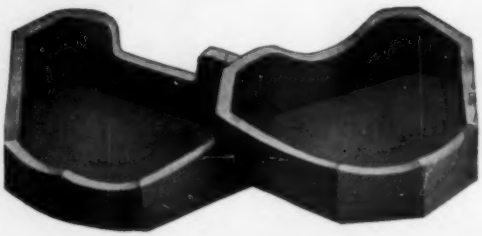

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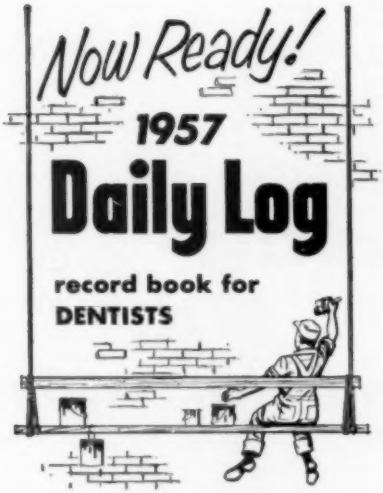

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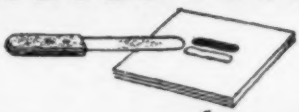

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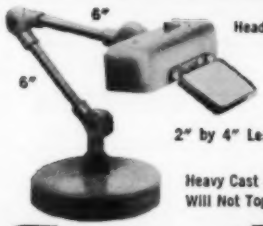

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American Dental Association
Oct. 1-4, 1956
Atlantic City, N. J.

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Be sure to indicate your arrival time in Atlantic City. Reservations will be held only until 6 p.m. of the day you indicate when you will arrive in Atlantic City unless special arrangements are made with the hotel.

Names of all persons who intend to occupy the accommodations must be listed on the application.

List four choices of hotels. Confirmation will be sent to the applicant indicating which hotel has accepted the reservation.

Write the A.D.A. Housing Bureau in Atlantic City if you wish to cancel the reservation.

A.D.A. HOUSING BUREAU • 16 CENTRAL PIER, ATLANTIC CITY, N. J.

(Please print or type) A.D.A.

Applicant:

Name_____

_____
(Street address) (City) (Zone) (State)

Arrival in Atlantic City_____ a.m. / p.m. Leaving_____

Accommodations:

Hotel_____ (First choice) Hotel_____ (Third choice)

Hotel_____ (Second choice) Hotel_____ (Fourth choice)

☐ Single occupancy, rate to range from $_____ to $_____ per day.
☐ Double occupancy, double bed, rate to range from $_____ to $_____ per day. } 2 names must be listed below
☐ Double occupancy, twin beds, rate to range from $_____ to $_____ per day. }
☐ Suite of_____ rooms, including parlor, rate to range from $_____ to $_____ per day.

Occupants: (use an extra page for listing additional names if necessary)
Room will be occupied by:

_____
(Name) (Address) (City) (State)

_____
(Name) (Address) (City) (State)

HOTELS IN ATLANTIC CITY

Key No.	Hotel	Single	Double	Suite Room with Parlor
1	Breakers	$5.00–11.00	$ 7.00–18.00	
2	St. Charles	6.00–10.00	8.00–14.00	$24.00–28.00
3	Morton	6.00– 9.00	8.00–12.00	
4	Clarendon	5.00– 6.00	7.00	
5	Seaside	6.00–11.00	8.00–14.00	28.00
6	Holmhurst		7.00– 8.00	
7	Colton Manor	7.00–10.00	9.00–14.00	
8	Abbey	6.00–10.00	8.00–14.00	
9	Haddon Hall	7.00–11.00	10.00–23.00	36.00–44.00
10	Chalfonte	7.00–11.00	10.00–23.00	
11	Lafayette	5.00– 8.00	8.00–14.00	18.00–30.00
11A	Carolina Crest	5.00– 7.00	7.00–10.00	
12	Penn-Atlantic		7.00–10.00	
13	Senator	5.00–11.00	7.00–16.00	28.00
14	New Belmont	4.00– 5.00	6.00–10.00	
15	Mayflower	6.00–11.00	8.00–14.00	
16	Flanders	5.00– 6.00	7.00–10.00	
17	Columbus		6.00– 8.00	
18	Lexington	5.00	6.50– 8.50	
20	Monticello	4.00– 5.00	7.00	
21	Richfield-Boscobel	4.00– 6.00	6.00– 8.00	
22	Sterling	5.00– 7.00	8.00–10.00	
23	Jefferson	6.00– 8.00	8.00–12.00	
24	Kentucky	3.50	6.00– 7.00	
25	Madison	6.00–12.00	7.00–14.00	
26	Traymore	8.00–22.00	10.00–24.00	20.00–45.00
28	Claridge	7.00–15.00	11.00–19.00	36.00
29	Crillon		8.00–12.00	
30	Eastborne	5.00– 8.00	7.00–11.00	
31	Runnymede	4.00– 7.50	6.00–10.00	
32	Marlborough-Blenheim	7.00–10.00	10.00–20.00	26.00–40.00
33	Dennis	7.00–12.00	10.00–22.00	35.00–45.00
34	Shelburne	6.00–16.00	10.00–22.00	39.00–50.00
36	Ritz-Carlton	6.00–18.00	8.00–22.00	35.00
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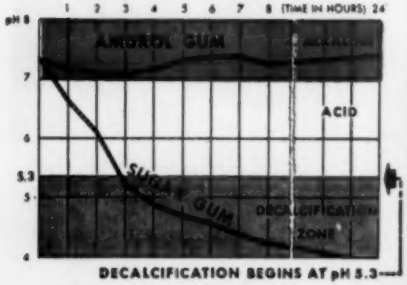

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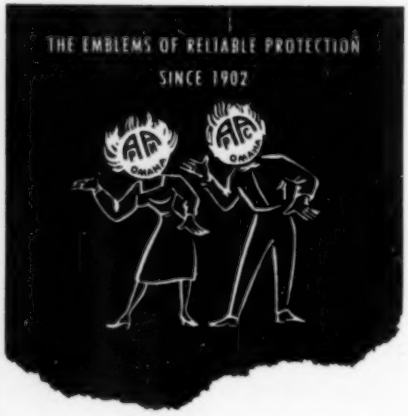

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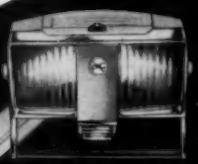

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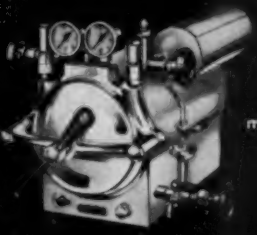

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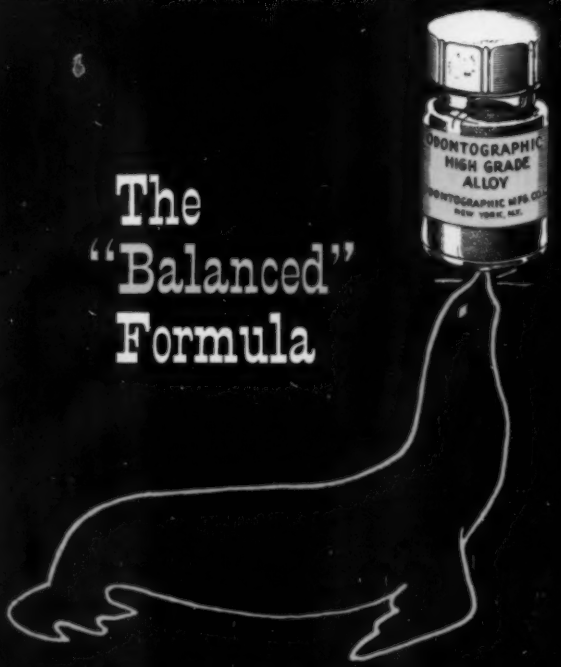

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